Injection rhinoplasty: non-surgical nasal augmentation and correction of post-rhinoplasty contour asymmetries with hyaluronic acid: how we do it

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Dear Editor,

Rhinoplasty is technically demanding surgery, and even in the best of hands, postoperative healing and ultimate aesthetic outcome can be unpredictable. In addition to the risks of general anaesthesia, and a protracted postoperative convalescence, rhinoplasty may lead to adverse cosmetic sequelae of pollybeak deformity, over reduction of the bony or cartilaginous dorsum, inverted V deformity, alar retraction, supratip depression and bossae. Patients may also have functional complaints secondary to iatrogenic nasal valve disruption. Even in patients with an initial satisfactory outcome, slight asymmetries, depressions and contour irregularities may present several years after surgery. Despite these risks, cosmetic rhinoplasty is increasingly popular. A recent survey of UK cosmetic practice by members by the British association of aesthetic plastic surgeons, found that rhinoplasty accounted for 9% of all cosmetic surgery in 2008, and 23% of all male cosmetic surgery.[1]

The refinement of techniques to restore facial volume with dermal fillers, and widely available botulinum injections to treat dynamic facial rhytids, has led to a surge in demand for non-surgical rejuvenation procedures. An increasingly well informed and discerning patient population now seek better value procedures that require minimal downtime and have instant results.

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Discreet volumetric changes in the fronto-nasal angle, nasal dorsum and nasolabial angle lead to significant differences in our perception of the nasal aesthetic. These areas can be injected with dermal fillers to rejuvenate the nasal profile and correct asymmetries.[2]

Technique

Informed consent is obtained from all patients for off label treatment with Restylane-Lidocaine® for soft tissue augmentation. Standardised pre-treatment frontal, lateral and 3/4 view photographs are taken with a Nikon D40x Digital SLR camera. Topical local anaesthetic with EMLA™ 5% cream (Lidocaine 25 mg, Prilocaine 25 mg) is applied to the radix, dorsum, tip and collumella for 30 min. The patient is positioned semi-recumbent on a couch.

Areas for correction are marked and prepared with an alcowipe (70% Isopropyl alcohol). Restylane-lidocaine® (Q-MED, Uppsala, Sweden) is injected in the subcutaneous plane just superficial to perichondrium or periosteum using a 30 gauge $^{1}/_{2}$ inches needle following aspiration to prevent inadvertent arterial embolisation. Linear threading, serial puncture and/or fanning techniques are used depending on the area and volume requiring correction. Injection superficial to the deep dermis was avoided to prevent local ischaemia and extrusion of the implant.

Immediately following injection, digital pressure is applied and the implant moulded into position. Haemostasis is achieved with light pressure using a cotton tipped

applicator. Finally, an ice pack is applied to minimise postoperative bruising and oedema. Patients are informed that they may experience some swelling, tenderness and redness for 1–2 days, but no specific aftercare instructions are necessary.

Case presentations

At the time of writing, the authors have performed 18 injection rhinoplasties (5 male, 13 female, age range: 22–61 years) The following cases were selected to demonstrate the spectrum of profile changes possible with the technique.

All photographs are taken immediately before injection rhinoplasty with Restylane®. Figures 1 and 2 show follow up at 1 month. Figure 3 demonstrates longevity of the filler correction with follow up at 18 months (Fig. 3a) and 30 months (Fig. 3b) respectively.

Discussion

The Renaissance artists sought to define beauty using objective mathematical models. The Fibonacci sequence (1, 1, 2, 3, 5, 8…) led to Phi the 'Golden Number' that defined beauty by symmetry and the apparent ratio of

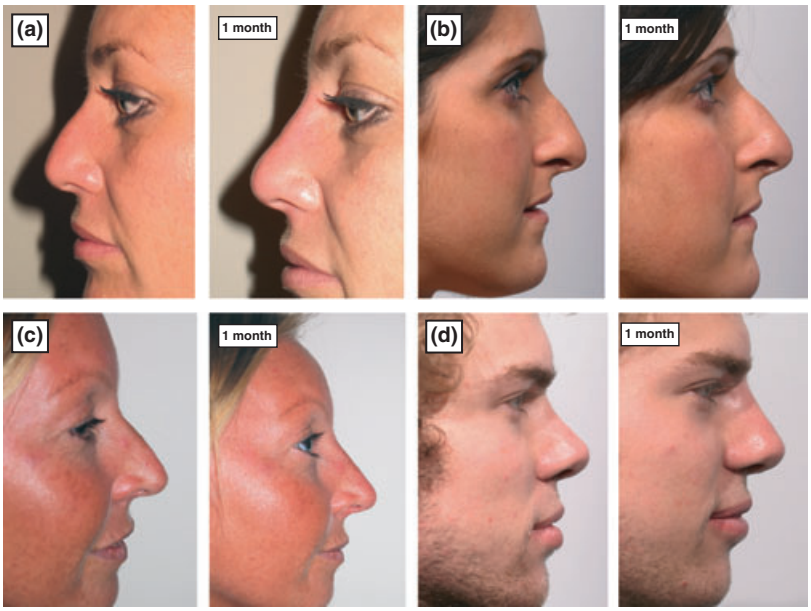

Fig. 1. Dorsal hump, saddle and tip ptosis. Underprojection and ptosis of the tip and dorsum hump (a–c) corrected with deep dermal injections at the collumellar base, supratip area superficial to perichondrium and subdermal radix. Radix augmentation for saddle deformity (d).

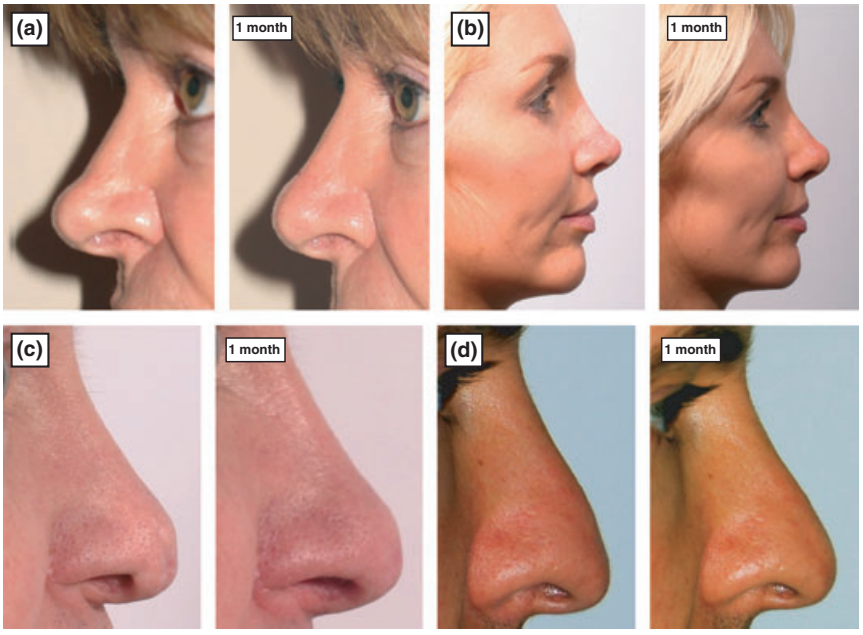

Fig. 2. Supratip depression and tip deprojection. Supratip depression (a, b) may be filled with hyaluronic acid to soften the supratip break. Deprojected tips (c, d) can be built up with an injectable shield graft.

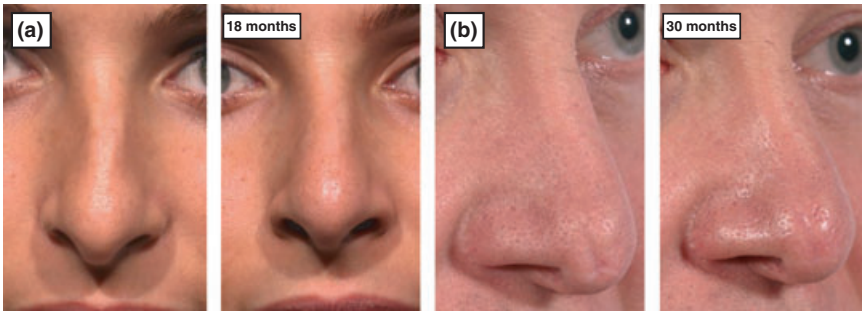

Fig. 3. Post-rhinoplasty correction. Right upper lateral cartilage disruption (a) causing internal value dysfunction, lateralised with an endonasal injectable spreader graft (at 18 month follow up), and volume replacement to tip scar (b and at 30 month follow up).

adjacent structures. The golden ratio, 1.61803, is reflected throughout nature, architecture, music and DNA. Ideal aesthetic nasal parameters for tip projection (facial margin-tip/dorsum), nasal length (radix to the tip defining point to the upper vermillion), and width (radix-columella line to alar margins) all achieve the golden ratio.

A multitude of techniques and refinements have since been described to surgically achieve the nasal aesthetic ideal. Whilst this ideal is subjective and dependent on ethnic variation, the rules of lengths, ratios and angles should be respected when planning surgical or non-surgical rhinoplasty.

Dermal fillers

Han *et al.* first described the concept of injectable filler rhinoplasty in 2006.[3] They combined autologous human fibroblasts with hyaluronic acid and injected the nasal dorsum. By adding fibroblasts, the authors hypothesized that permanent collagen would remain following hyaluronic acid resorption. The volume replacement was maintained at 1 year follow up, however the technique was limited by significant preparatory time as the fibroblasts had to be harvested and cultured *in vitro* prior to injection.

Whilst a comprehensive review of the available dermal fillers such as that published by the American society of dermatologic surgery[4] is beyond the scope of the article, familiarity with the available fillers and injection techniques is essential before embarking on injection rhinoplasty. Fillers can be broadly classified into fat, collagen, silicone, poly-L-lactic acid (PLLA), hyaluronic acids and calcium hydroxylapatite. The latter two are most appropriate for injection rhinoplasty, due to their excellent safety profile, predictable volume replacement, moulding capability and temporary nature.

Hyaluronic acid is a naturally occurring glycosaminoglycan polysaccharide composed of alternating residues of the monosaccharides D-glucuronic acid and *N*-acetyl-D-glucosamine found in mammalian dermis. Injectable hyaluronic acid was first approved by the FDA in 2003. It is a viscous clear gel derived from the cock's combs of domestic fowl (Hylaform®) or from fermentation by Streptococci (Perlane®, Restylane®; Uppsala, Sweden, Captique®, Juvederm Ultra®; Allergan, and Elevess®; Annika Therapeutics, Massachussets, USA). After implantation into tissues, hyaluronic acid strongly binds water to form hydrated polymers. From 6 months it is metabolized into carbon dioxide and water and eliminated by the liver; however, in our experience, Restylane® lasts much longer in the nose (at least 18 months as demonstrated in Fig. 3) compared with correction of dynamic facial soft tissue rhytids and folds.

Calcium hydroxylapatite (Radiesse®) consists of a 30% concentration of 25–45 μm spherical particles suspended in sodium carboxymethylcellulose gel. It is FDA approved for facial soft tissue augmentation specifically correction of moderate to severe facial lines and folds and correction of soft tissue loss from HIV lipoatrophy, vocal cord augmentation and as a radiological tissue marker. Following injection, the gel is phagocytised and the calcium hydroxylapatite microspheres displace surrounding soft tissue. Collagen proliferation and slow degradation of the microspheres leads to a prolonged duration of effect up to 2 years. The microspheres are excreted as calcium and phosphate via the urinary system.

Injection techniques

Injection augmentation of a deep radix will soften the fronto-nasal angle and may disguise a prominent rhinon and dorsal cartilaginous hump. Medial linear subcutaneous threading of the bony and cartilaginous dorsum will narrow a broad nose, and lengthen a shortened nose. Saddle nose deformity and/or upper lateral collapse may be disguised with injection superficial to perichondrium. Functional internal valve collapse may be addressed with an endonasal 'spreader' injection of calcium hydroxylapatite (Radiesse®) in to the apex of the internal nasal valve.[5] An underprojected tip may be built up by supratip injection followed by moulding to the desired aesthetic result. Nasal tip ptosis can be addressed with single puncture injection into the collumellar base to open the nasolabial

angle. This angle may be opened further with injection of 2 units of Botox® (Allergan Inc., Irvine, California, USA) into the depressor septi muscle.

Complications of surgical rhinoplasty may also be treated with filler injection. Collumellar and alar retraction may be corrected. These are often complicated by scarring, and the absence of a bony plate to stabilise the implant, however prior infiltration of local anaesthetic can help stretch the scarred tissue before injection of filler.[6] Minor post-rhinoplasty asymmetries, irregularities and bony prominences may also addressed.[7]

Adverse effects

Potential major complications of injection rhinoplasty include infection, ischaemic necrosis from arterial embolism, pressure necrosis from overinjection of nasal tip and osteophyte from periosteal injection.[8] These risks may be reduced, with effective nasal analysis, meticulous injection technique, and a good understanding of nasal cartilaginous and vascular anatomy. Radix and upper nasal third injections should be medially placed to avoid the dorsal and lateral nasal arteries. Pre-injection palpation may aid identification, and aspiration before injection is mandatory. Intravascular filler injection can lead to arterial embolisation and subsequent skin necrosis[9] or retinopathy.[10] Visual impairment following middle facial third filler injection mandates urgent opthalmological review to exclude retinal embolism. Prompt anticoagulation and hyaluronidase injection may be a useful adjunct should complications arise.[11]

Ethical considerations

Ethics approval was not sought as injectable hyaluronic acid is already licensed for mid-facial rejuvenation.

Conclusion

Injection rhinoplasty is not a substitution for surgical rhinoplasty. There are many indications where it will be insufficient to achieve the desired aesthetic outcome. Noses that are significantly overprojected, or overrotated, have a shallow radix, and tension noses are better suited to surgical correction. It is however a useful postoperative adjunct to surgery or in those patients contemplating rhinoplasty. The non-permanence and minimal morbidity of associated with degradable fillers is especially beneficial to those patients who seek cosmetic rhinoplasty but are discouraged by the risks and convalescence of surgery.

Keypoints

- Current alternatives to cosmetic nasal reshaping are invasive, and limited to endonasal and open rhinoplasty.
- Both require general anaesthesia, a prolonged postoperative recovery time, significant cost and the risk of dissatisfaction with the aesthetic and/or functional outcome.
- We describe our experience with, and present eight cases of hyaluronic acid injection rhinoplasty – a non-surgical 'office based' alternative to improve contour and internal valve deficiencies, tip projection/rotation, collumellar retraction and dorsal irregularities.

Conflict of interest

None declared.

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