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Radiological features of periorbital hyaluronic acid fillers: A case series

Cassie Cameron[1], Valerie Juniat[1], Sandy Patel[2], Dinesh Selva[1]

[1]Department of Ophthalmology Royal Adelaide Hospital, Adelaide, Australia

[2]Department of Medical Imaging, Royal Adelaide Hospital, Adelaide, Australia

ABSTRACT

Periorbital fillers are widely used as a minimally-invasive method of soft-tissue augmentation, though have been associated with serious complications including infection, foreign-body granuloma, and filler migration. Such complications are often challenging to distinguish from other diseases of the periorbital region and are frequently missed on clinical examination. Hyaluronic acid (HA) fillers have distinctive morphology and signal characteristics on imaging, typically demonstrating low T1 and high T2 signal intensity with distinct, serpiginous borders. Thus, familiarity with the typical imaging features of these fillers and their associated complications may be useful to prevent diagnostic confusion and delay. We describe the clinical and magnetic resonance imaging findings in three patients with periorbital HA filler injections.

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Periorbital; fillers; hyaluronic acid; filler migration

Introduction

Periorbital filler injections are commonly used in cosmetic practices as a minimally-invasive method of soft-tissue augmentation [1–3]. While the majority of side effects associated with periorbital injections are relatively minor and often reversible, serious complications including infection, delayed granulomatous reaction, and filler migration have been known to occur [1,3–5]. Such complications may arise several years after an injection and present with non-specific symptoms and signs [3]. Consequently, they can be challenging to distinguish from other inflammatory or malignant diseases of the periorbital region, and are frequently missed on clinical examination [6]. Periorbital fillers have distinctive morphology and signal characteristics on imaging, and are encountered with increasing frequency as an incidental finding. We describe the clinical and radiological findings in three patients with periorbital hyaluronic acid (HA) filler injections.

Case 1

A 62-year-old woman presented with left-sided ptosis following retinal cryotherapy 8 months prior. She was also noted to have right upper lid swelling and lateral flare. She had been diagnosed with Graves' disease 2 months previously and had received HA filler injections to both upper cheeks 3 years previously. Magnetic resonance imaging (MRI) showed some filler migration up the lateral rim proximate to the right lacrimal gland, which was enlarged (Fig. 1). She underwent a left ptosis repair and the right lacrimal gland was biopsied at the time to exclude a filler reaction. There was no evidence of a granulomatous reaction on histology, and the histology was consistent with thyroid eye disease related enlargement.

Case 2

A 46-year-old woman presented with progressive lower lid swelling following HA filler injections to both tear troughs and upper cheeks 18 months prior. These had begun as small firm nodules beneath the eyes and had rapidly progressed in size over a period of 4 weeks until both lower eyelids became swollen and discolored. MRI showed subcutaneous oedema corresponding to the infraorbital injection sites and extending over the inferior orbital margin (Fig. 2). Her symptoms spontaneously resolved without any medical or surgical intervention.

Contact Cassie Cameron ✉ cassie.cameron@flinders.edu.au Royal Adelaide Hospital, Adelaide, Australia.

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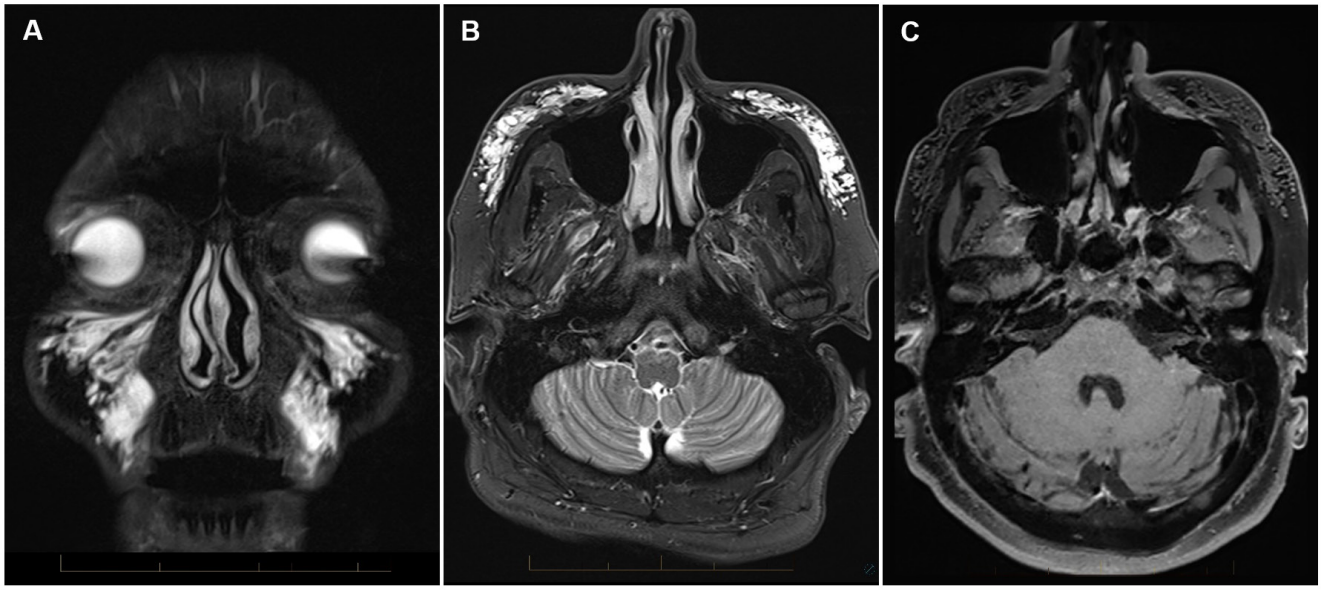


Figure 1. MRI orbit (case 1): fat suppressed T2 coronal (A) and axial (B), and fat suppressed, post contrast T1 axial (C) images demonstrating HA filler throughout both cheeks, which appears hyperintense on T2-weighted imaging. The filler is seen migrating towards the orbits in (A). Post-contrast T1 images showed no enhancement (C), suggesting there was no inflammatory response associated with the filler (in agreement with clinical findings).

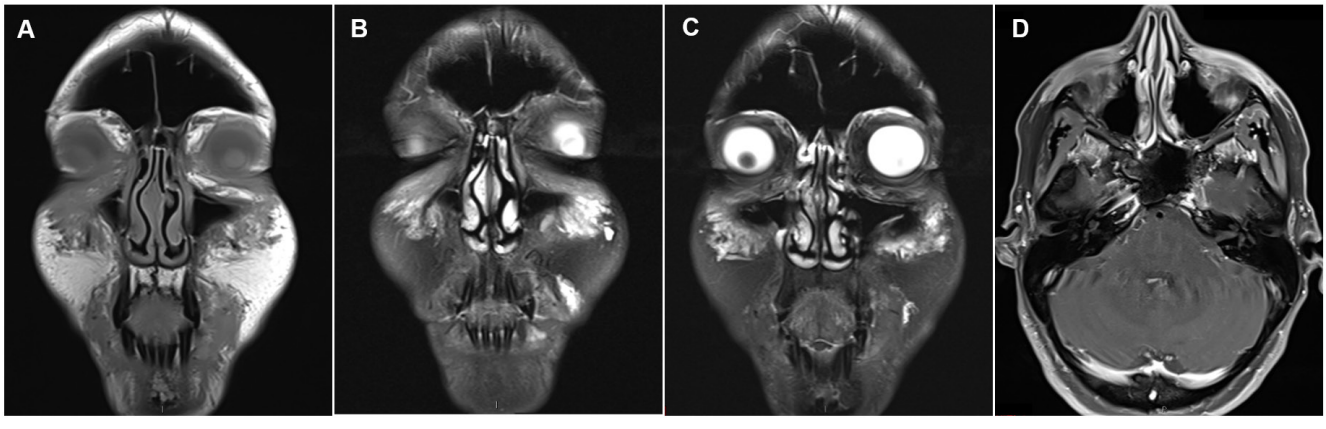


Figure 2. MRI orbit (case 2): T1 coronal (A), fat suppressed T2 coronal (B, C) and fat suppressed, post contrast T1 axial (D) images. HA filler is seen throughout the cheek and infraorbital region extending to the tear troughs as hyperintense signal on fat suppressed T2 coronal images (B, C). T1 (A) demonstrates diffuse inflammation corresponding to route of filler migration, which appears isointense to the orbicularis muscle.

Case 3

A 56-year-old woman presented with bilateral lower lid swelling and crepe-like skin 10 months after she underwent lower eyelid, cheek, and jawline HA filler injections. MRI showed irregular bands of high T2 signal within the subcutaneous fat and symmetrical infraorbital oedema bilaterally, which corresponded to her injection sites (Fig. 3). She was treated with 10 international units of hyaluronidase to each lower eyelid at the inferior orbital margin. She showed significant improvement to her symptoms at 2 month follow up and has declined further hyaluronidase treatment.

Discussion

The use of periorbital fillers for cosmetic and medical purposes has become increasingly prevalent over the past 10–15 years [1,3]. Whilst generally considered safe, injectable fillers are associated with a range of immediate and delayed-onset complications, including hypersensitivity reactions, infection, inflammation, abscess formation, foreign-body

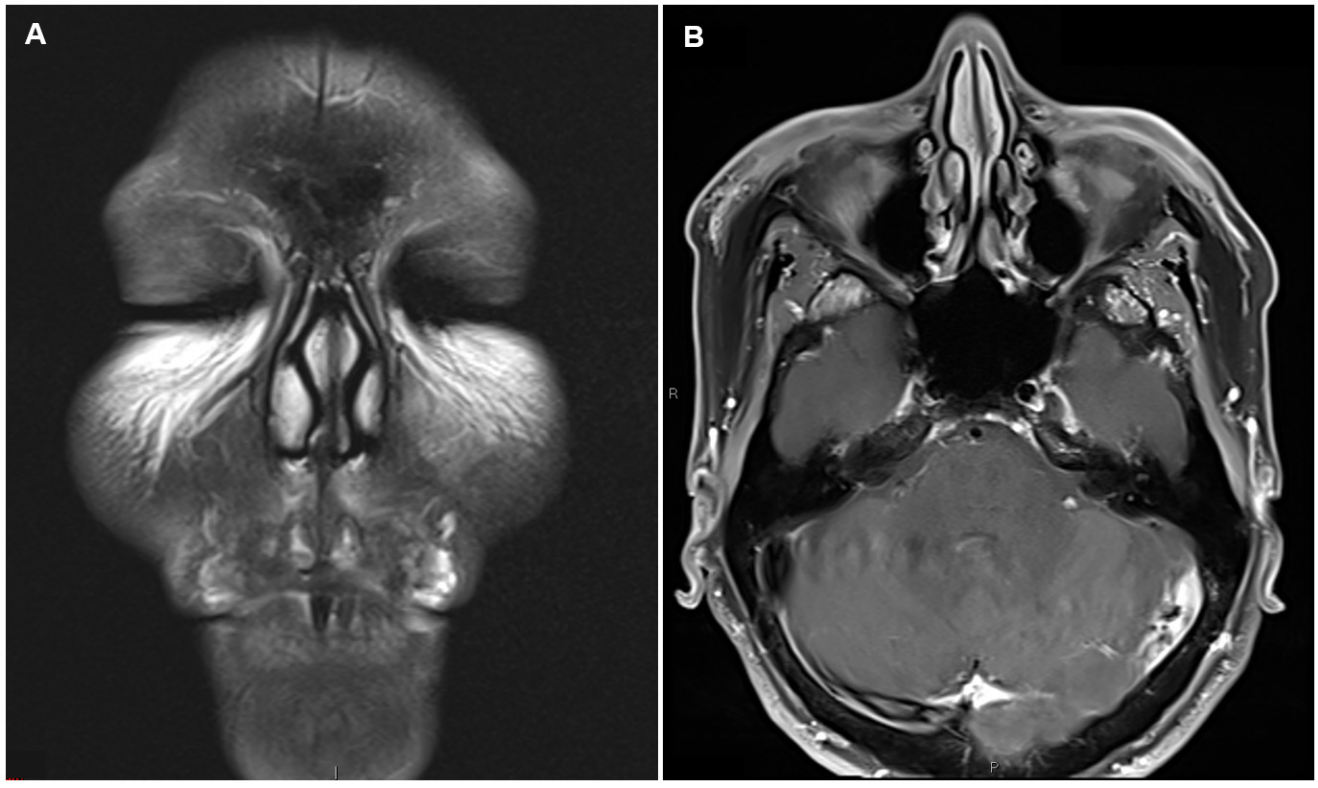


Figure 3. MRI orbit (case 3): fat suppressed T2 coronal (A) and fat suppressed, post contrast T1 axial (B) images demonstrating inflammation in the infraorbital margin. There was less inflammation on post-contrast imaging compared with case 2 (Fig. 2D), but in a similar region.

granuloma, and filler migration [1,2,7]. Such complications can pose a diagnostic challenge, owing to the non-specific clinical appearance and the tendency for patients to withhold pertinent information regarding their use of cosmetic injections [3].

HA fillers are biocompatible, temporary fillers which are widely used for both cosmetic enhancement and correction of HIV-associated lipoatrophy [7]. They are generally considered safe, though have been associated with several complications including late-onset granulomatous inflammation and superficial migration [8]. In most instances, however, complications arising from HA fillers may be rapidly reversed via administration of hyaluronidase to the filler site [3,7]. HA filler products demonstrate variable cross-linking structures and resultant viscosities which affects their pattern of distribution within the tissue [3,7]. Once administered, HA fillers incorporate with endogenous HA, binds water and promotes collagen formation, temporarily augmenting volume at the injection site [3,9]. The aesthetic effects of HA fillers typically last between 1 and 12 months, gradually diminishing due to reabsorption by the body, though may persist for several years after injection [3,5,8]. Anecdotally, HA filler material can be seen as glistening globules peri-operatively. They also do not tend to get walled off, which may make them more mobile within tissue planes. Filler migration can occur via the lymphatic or vascular circulations and may deposit at distal sites, resembling malignant or inflammatory processes [3]. As a result, the differential diagnosis may be unnecessarily broad in cases where a history of filler injection is not initially disclosed.

Several studies have documented the radiological features of HA fillers and their associated complications on MRI and computed tomography (CT) [3–5,7]. MRI is generally considered the preferred imaging modality for identifying fillers and related complications on account of its superior soft-tissue resolution and multi-parametric images [3,5]. Specifically, T2-weighted and post-contrast T1-weighted sequences are the most useful for assessing HA filler morphology and associated inflammation, respectively, and can demonstrate degradation of the filler over time [3,5,7]. HA fillers will typically demonstrate low T1 and high T2 signal intensity due high fluid content, and often exhibit distinct, serpiginous borders [3–5,9]. One study described multiple spots of T1 hypointensity

Table 1. Clinical and radiological features of periorbital filler migration.

Case	Age, gender	Filler product	Injection site	Delay from injection to presentation	Clinical appearance	Radiological investigations	Radiological findings	Management	Follow-up period	Outcome
1	62, F	Hyaluronic acid	Upper cheeks (bilateral)	3 years	Asymptomatic	MRI	T2 hyperintensity of subcutaneous compartment of both cheeks	No intervention needed	4 months	No change (not symptomatic)
2	46, F	Hyaluronic acid	Tear troughs (bilateral)	2 years	Hardness, swelling and discolouration of the inferior periorbital region bilaterally	MRI	T2 hyperintensity of subcutaneous infraorbital tissue extending over the inferior orbital margin	No intervention needed	2 months	Resolved without treatment
3	56, F	Hyaluronic acid	Lower eyelids, cheek and jawline (bilateral)	10 months	Redundancy of periorbital skin inferiorly	MRI	T2 hyperintensity within the subcutaneous fat and infraorbital tissue	Hyaluronidase	2 months	Significant improvement—no further hyaluronidase treatment

MRI = magnetic resonance imaging.

and T2 hyperintensity, resembling round liquid droplets, in asymptomatic patients with HA fillers in the lips and nasolabial folds [5]. Some contrast enhancement may be seen initially, due to increased tissue vascularization at the injection site, though this feature typically subsides from 2 to 6 months post-injection [3,7,9]. On CT, attenuation of HA filler resembles that of soft-tissue and may appear to infiltrate adjacent subcutaneous fat [3,7]. Whilst less effective in discriminating soft-tissue compared with MRI, CT may be useful to identify areas of dystrophic calcification, which, though nonspecific, can indicate the presence of certain filler materials (e.g. calcium hydroxyapatite) or filler-associated complications (e.g. foreign body granuloma) [3].

A study by Kadouch et al. [6] evaluated the degree of clinicoradiological agreement in cases of filler-related complications, and found that such complications may be frequently missed on clinical examination alone. In particular, instances of low-grade inflammation and filler migration were frequently missed clinically (clinicoradiological agreements of 32% and 9%, respectively) [6]. These findings highlight the potential utility of radiological imaging in identifying and, to some extent, differentiating between these clinically ambiguous complications.

We present the radiological features seen in three female patients with complications following periorbital HA filler injection (summarized in Table 1). The delay from filler injection to presentation ranged from 10 months to 3 years. MRI was performed for all patients and similar radiological findings were described in each. Filler migration was seen in two cases (Figs. 1 and 2). In case 1 of our study, there was further swelling and hyperintensity of the superolateral orbit/superior rectus that was contiguous with the lacrimal gland, representing the route of HA migration. The area of abnormal tissue had ill-defined margins and showed moderate contrast enhancement. All cases demonstrated T2 hyperintense signal corresponding with the sites of filler injections (nasolabial folds, cheeks, and perioral region) on axial and coronal scans, representing the high fluid content of the HA filler [3]. In the two patients who presented with symptoms, T1-weighted post contrast imaging showed areas of enhancement representing regions of inflammation associated with the filler substance (Figs. 2D and 3B). Conversely, the absence of contrast enhancement in case 1 (Fig. 1C) suggested there was no filler-related inflammatory response, which correlated with her clinical findings (asymptomatic). Patient outcomes were excellent and all showed resolution of symptoms within 2 months.

Although serious complications of periorbital HA fillers are an uncommon occurrence, the clinical and radiological findings associated with this condition can be challenging to differentiate from other inflammatory or neoplastic processes. Thus, thorough history-taking and familiarity with the radiological characteristics of periorbital fillers may help to mitigate diagnostic confusion and prevent unnecessary investigations.

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