Injection of dermal fillers for facial rejuvenation is a minimally invasive procedure frequently used in cosmetic procedures. Different types of dermal fillers injected include autologous fat, collagen, hyaluronic acid, polylactic acid, calcium hydroxylapatite, and polymethylmethacrylate. Complications from these procedures are rare but have been reported to include blindness, cerebral ischemic events, and even death. We describe 3 patients who presented with sudden loss of vision after injection of 3 different dermal fillers into the forehead area. In all 3, occlusions in the distal ophthalmic artery distribution were subsequently diagnosed.

**Report of Cases**

**Patient 1**
A healthy man in his late 30s presented 3 weeks after he noticed superior field visual loss in his left eye the day after an injection of a hyaluronic acid filler injection to his forehead. At the initial visit, his visual acuity was 20/20 OD and 20/30 OS. Dilated fundus examination of the left eye revealed retinal edema and whitening in the inferotemporal macula consistent with a branch retinal artery occlusion. The whitening extended to the fovea, and a partial cherry-red spot was seen in the central macula, along with scattered intraretinal hemorrhage (Figure 1A). Fluorescein angiography demonstrated blockage of the inferior branches of the retinal circulation in the left eye and areas of patchy choroidal nonperfusion (Figure 1B).

One year later, the patient continued to experience a superior visual field defect in the left eye. His visual acuity was 20/25 OS. Optical coherence tomography demonstrated selective retinal thinning of the inferior macula (Figure 1C).

**Patient 2**
A healthy woman in her early 60s presented the same day she experienced severe loss of vision, which occurred immediately after autologous fat injection into the high part of her forehead; the needle marks were visible just below the hairline. Her visual acuity was no light perception OD and 20/40 OS. Dilated fundus examination of the right eye revealed diffuse whitening of the retina, as well as lipid-filled arterioles (Figure 2A). Fluorescein angiography demonstrated patchy choroidal filling and incomplete filling of the retinal arterioles in the later frames (Figure 2B and C). A complete blood cell count was obtained, with differential count, erythrocyte sedimentation rate, and C-reactive protein level; all values were within normal limits. Carotid Doppler ultrasonography and cardiac echocardiography revealed no abnormalities.

**Patient 3**
A healthy woman in her mid-40s presented to the clinic after having received an injection of bovine collagen and polymethylmethacrylate microspheres (Artefill; Suneva) to her forehead creases that morning. After the injection was complete, she opened her eyes and could not see with her right eye. Her visual acuity was no light perception OD and 20/20 OS. A right afferent pupillary defect was demonstrated. Dilated fundus examination showed a
cherry-red spot and retinal edema, in keeping with a central retinal artery occlusion (Figure 3A). Fluorescein angiography demonstrated delayed filling of some of the proximal arteries in the right eye, but the filling was patchy (Figure 3B and C).

Because this was an acute presentation, we performed anterior chamber paracentesis and removed 0.1 mL of aqueous to rapidly lower the intraocular pressure. In the clinic, the patient received a liter of normal saline solution intravenously and underwent ocular massage; she was then transferred to receive hyperbaric oxygen therapy. Two days later, her right pupil was minimally reactive to light and her visual acuity was faint light perception OD.

Discussion
Owing to the rich extensive anastomotic network between the internal and external carotid circulations in and around the ocular...
area, any injection done in that anatomical area poses a risk of material entering the ophthalmic artery, presumably via retrograde flow from the supratrochlear, supraorbital, and dorsal nasal artery. This phenomenon of injectable material flowing from the external carotid circulation to the ophthalmic circulation via high-pressure retrograde flow has been identified several times when corticosteroid and autologous fat emboli entered into the retinal circulation.\textsuperscript{1-3} Hyaluronic acid–based filler has also been reported to enter the ophthalmic circulation via the external carotid circulation after high-pressure injection.\textsuperscript{4} Injected emboli have been reported to enter the ophthalmic circulation from the nasolabial folds;\textsuperscript{5} from glabellar,\textsuperscript{6} intranasal,\textsuperscript{7} and periorcular\textsuperscript{6} sites; and now, with our series, from the forehead.

Any substance injected at high pressure into the ocularfacial area, including the forehead, can result in occlusion of the central or branch retinal artery or the posterior ciliary circulation, both of which branch from the ophthalmic artery. The presentation of central or branch retinal artery occlusion is distinct and classic, with sudden loss of vision, retinal whitening, and a cherry-red spot. In the case of solely posterior circulation occlusion, the fundus appears normal in the setting of sudden visual loss, but fluorescein angiography reveals choroidal filling defects. All 3 of our patients had both choroidal filling defects and retinal arterial involvement.

In the setting of sudden vision loss, one must consider the possibility of vasculitis (and giant cell arteritis in older patients) and carotid and cardiac embolic sources. A recent injection of cosmetic facial filler in an otherwise healthy individual can be considered causative when laboratory and cardiovascular examination findings are normal. Although uncommon, retrograde flow of foreign material into the ophthalmic artery from the external carotid circulation must be considered in this setting.

Our case series represents both retinal arterial and choroidal artery occlusions from a variety of fillers injected into the forehead region. The indication for fillers are limited to the nasolabial folds and lips by the manufacturers, yet they are often used in other areas. A review of the product and safety information from the manufacturers for many fillers indicates that safety has been established only in specific facial regions (varying by product, but generally the nasolabial folds or lips).

The visual effects of arterial occlusion by filler are devastating and irreversible in otherwise healthy patients. It is imperative that any physician considering injection of facial fillers carefully consider the location of the injection and respect the rich anastomotic vascular supply of the periorcular region. Ocular arterial occlusion is an uncommon adverse effect of these treatments, but it can be a devastating consequence of injection into areas of rich anastomoses (much of the periorcular region). We recommend that blindness or significant visual loss be added as a risk when discussing these procedures with patients, because these are devastating consequences.

**REFERENCES**


