

## Multiple Arterial Embolism After Illicit Intranasal Injection of Collagenous Material

DO-YOUNG KWON, MD, PHD,\* MOON HO PARK, MD, PHD,\* SEONG-BEOM KOH, MD, PHD,\*  
EUN-SANG DHONG, MD, PHD,<sup>†</sup> SE-HYUN BAEK, MD, PHD,<sup>‡</sup> HWA JUNG RYU, MD,<sup>§</sup> AND  
KUN WOO PARK, MD, PHD\*

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Local injections of various materials to the face have become increasingly popular for cosmetic purposes. These procedures can cause serious adverse effects if they are not done properly or if they are performed with improper materials. Embolic arterial occlusion is rare but can be a devastating complication after injection in the facial area. Here we report multiple embolic occlusions involving branches of the internal carotid artery (ICA) and the external carotid artery (ECA) with anatomical considerations. In this case, a reticular pattern of skin necrosis, retinal branch artery occlusion (RAO), acute cerebral infarction, and secondary subarachnoid hemorrhage (SAH) occurred immediately after illegal intranasal injection of a collagenous substance. This is the most extensive and devastating case of embolic complications involving branches of the ICA and ECA after illicit facial injection for cosmetic purposes ever reported.

### Case Report

A 39-year-old previously healthy woman received an injection of collagenous filler material into the left nasal septum for a nasal tip-plasty. An acquaintance performed this procedure illegally at a beauty salon using a self-manufactured syringe. The injection was given in the left anterior nasal septum (Figure 1C).

During the injection, the patient felt pressure and immediately complained of complete loss of vision in her left eye and a headache. She was transferred to the emergency department of our hospital. On examination, there was a violet-colored reticular pattern discoloring the skin on the left side of the nose, supra-orbital area, forehead, and philtrum (Figure 1A). There was no perception of light in the left eye, with complete opacification of the cornea and iris, complete ophthalmoplegia, and ptosis of the left eye (Figure 1A). After fundus photography, multiple RAOs were identified (Figure 2). Diffusion-weighted imaging (DWI) and magnetic resonance imaging (MRI) of the brain were performed to evaluate the patient's continued headache, which revealed an acute cerebral infarction of the superior frontal subcortex. This infarction followed the territory of the distal middle cerebral artery, despite a normal neurological examination except headache (Figure 3A and B). A cerebrospinal fluid (CSF) study, which was also performed for the suspicious hemorrhage signals on brain MRI (Figure 3C), revealed a high red blood cell count (3,220/mm<sup>3</sup>; old form, 90%) with no white blood cells. A high intracranial pressure (250 mmH<sub>2</sub>O; normal, 100–180 mmH<sub>2</sub>O) was also noted. These findings are compatible with the diagnosis of subarachnoid hemorrhage of another part of the distal branch of the middle

Departments of \*Neurology, and <sup>†</sup>Plastic and Reconstructive Surgery, <sup>‡</sup>Ophthalmology, Korea University College of Medicine, Ansan-city, Gyeonggi-do, Republic of Korea; <sup>§</sup>Theme Dermatologic Clinic, Republic of Korea

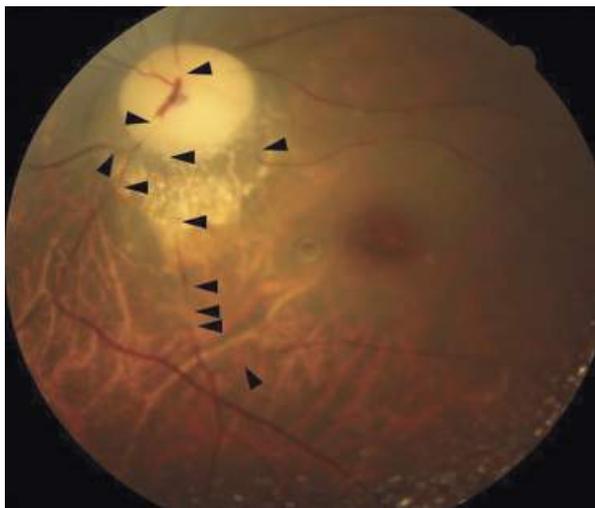
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**Figure 1.** (A) Violet-colored reticular-pattern discoloration of the skin at the left forehead, lateral nose, and the philtrum at the time of admission. (B) The skin lesions underwent focal necrosis and pus formation after 3 days. (C) Initial injection site at the left nasal septum (arrow).

cerebral artery. Conventional cerebral angiography showed occlusion of the left distal facial artery and the left retinal artery (Figure 3D and E). Laboratory evaluations for other possible origins of embolic stroke, including vasculitis, arrhythmia, and cardiac abnormalities, were all within normal range. The

skin lesions underwent focal necrosis over 3 days (Figure 1B). The patient received conservative management of her skin lesions and was prescribed a low-dose antiplatelet agent and a calcium channel blocker to prevent further progression of the stroke lesions. She remains blind in her left eye.

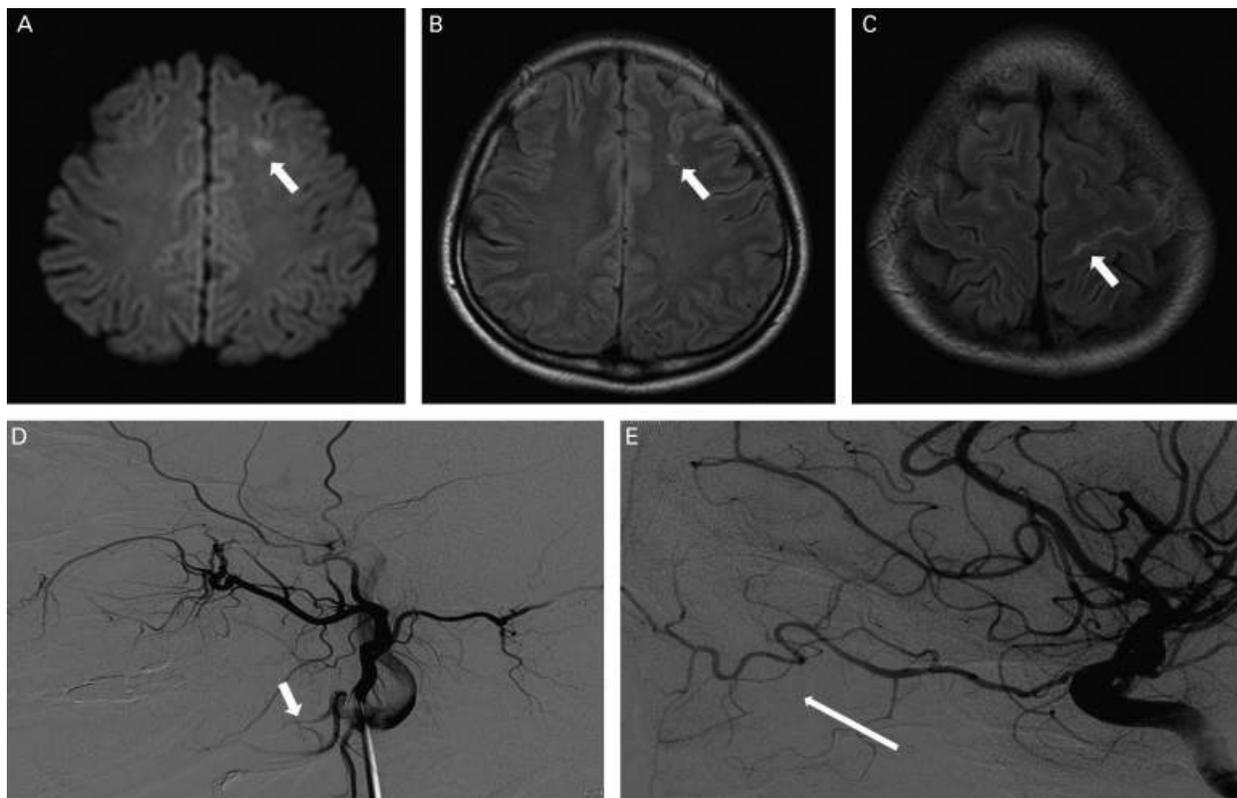


**Figure 2.** Retinal branch artery occlusion. Multiple emboli (arrowheads) interrupted blood column after injection into the nasal septal region.

## Discussion

Embolic arterial occlusion after cosmetic procedures is rare, but injections to the face can cause devastating complications. Factors that increase the risk include the site of injection and the type of filler material used. The techniques used during injection and the skill of the practitioner are also important determining factors.<sup>1</sup>

Discoloration of the skin and visual loss after filler injection to the glabellar area have been previously reported.<sup>2-6</sup> Cerebral ischemia was also reported as one of the serious complications secondary to local injection.<sup>2,7</sup> Under the forceful injection pressure, retrograde flow that brings filler materials could be a possible cause of distal embolic occlusion of multiple sites.<sup>7</sup>



**Figure 3.** Axial plane diffusion-weighted imaging (b-value 1,000 s/mm) (A) and fluid-attenuated inversion recovery (FLAIR) magnetic resonance imaging (MRI) (B) of the brain revealed acute cerebral infarction of superior frontal subcortex and distal middle cerebral artery territory (arrow). (C) FLAIR MRI demonstrated high signal intensity along the sulci of the superior frontal cortex, suggesting subarachnoid hemorrhage of the more distal middle cerebral artery territory (arrow). (D) Occlusion of the proximal facial artery and (E) absence of left choroidal blush and invisible left central retinal artery on cerebral angiography (arrow), suggesting occlusion of a branch of the ophthalmic artery.

Our patient had multiple arterial occlusions of embolic origin immediately after injection of the collagen into the nasal septum. When considering the anatomical possibilities for the multiple embolic events with one injection,<sup>8</sup> we postulated that filler materials were injected into the rich vascularized area at the anterior nasal septum, called Kisselbach's area, an area of anastomosis between the ICA and ECA. We further propose the possibility that concurrent embolic occlusion occurred in both the ICA and the ECA with a single-point injection.

For the ICA, embolized filler material might first enter the ocular circulation through the ethmoidal artery into the central retinal artery, a branch of the ophthalmic artery, resulting in RAO, and then travel

retrograde to the intracranial middle cerebral artery through ICA flow, resulting in cerebral infarction and distal embolism with secondary hemorrhagic transformation. Occlusion of the extracerebral branch of the ICA and the supratrochlear and supraorbital artery that linked to the ethmoidal artery proximally also caused discoloration of the forehead area.

For the ECA, retrograde flow from Kisselbach's area went to the lateral posterior nasal and sphenopalatine arteries and finally reached the distal branch of the facial artery, the superior labial artery, angular artery, and dorsal nasal artery by way of the maxillary artery and the ECA. This led to skin discoloration of the nose and philtrum.

The causes of the multiple arterial embolism observed in the present case can be considered at four points. First, an illegal practitioner performed the injection without anatomical considerations. Second, the practitioner forgot to aspirate before injection. Third, the illicit injection material was coarse, which caused the practitioner to push the plunger of the syringe too forcefully. Fourth, the amount of injected filler was too great for a local injection, which caused emboli to spread to multiple areas. To the best of our knowledge, this is the most extensive and devastating case of complications involving branches of the ICA and ECA after illicit facial injection for cosmetic purposes. Retrograde spread of the embolic source into multiple arterial branches of the ICA and ECA could be responsible for these various clinical symptoms. Filler injections into the nasal septal region should be regarded as high-risk procedures. To avoid serious embolic complications, only qualified practitioners should offer cosmetic filler injections, with approved materials and sterile procedures, and physicians should know more about arterial anatomy around the facial area. Furthermore, once the embolic accident has occurred during filler injection, the possibility of a brain lesion should be considered when a patient complains of headache.

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Address correspondence and reprint requests to: Moon-Ho Park, MD, PhD, Department of Neurology, Korea University Ansan Hospital, 516 Gojan-1-dong, Danwon-gu, Ansan-city, Gyeonggi-do 425-707, South Korea, or e-mail: kwondoya@hanmail.net