

# Distal Internal Maxillary Artery Occlusion with Palatal Necrosis following Cheek Injection with Calcium Hydroxylapatite

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**Summary:** Accidental intravascular injection of cosmetic fillers resulting in dermal infarction represents one of the most feared complications in aesthetic medicine. Despite the infrequency of these injuries, the rapid rise in filler use has caused a sudden increase in the incidence of filler-induced skin necrosis. Because the complex vascular anatomy of the face subserves a wide range of cutaneous and mucosal tissues, it has been surmised that occult injuries affecting the oronasal cavities could occur as a result of accidental intravascular injection of dermal fillers. We report an instance of ischemic skin injury of the infraorbital territory of the face with hemi-palatal mucosal necrosis secondary to vascular occlusion with calcium hydroxylapatite. (*Plast Reconstr Surg Glob Open* 2022;10:e4164; doi: 10.1097/GOX.0000000000004164; Published online 7 March 2022.)

The rapid growth in the utilization of dermal fillers globally has led to a substantial increase in the number of reported cases of severe injuries resulting from accidental intravascular injection and embolization of filler.<sup>1</sup> These injuries have the potential for devastating sequelae, ranging from disfiguring facial skin and soft tissue necrosis to vision loss, stroke, and death.<sup>2</sup> Although occurrences of neuro-ophthalmological and dermal injuries have been well documented in the literature, those describing filler-induced mucosal infarcts have been seldom reported.<sup>3</sup> These injuries, predominantly impacting the oral and nasal cavities, may be associated with additional muscular, dental, and bony damage that can be easily missed due to their occult nature.<sup>4</sup> Here, we describe the first published instance of palatal necrosis arising from the inadvertent injection of dermal filler into the cheek.

## CASE REPORT

A 64-year-old woman presented to the emergency department with sudden severe right facial pain,

presyncope, and vomiting following cosmetic filler injections to the face approximately 4 hours earlier. The patient described having undergone an injection of calcium hydroxylapatite filler into the right medial cheek, by a board-certified plastic surgeon when she felt a severe sudden pain involving the right maxillary region. The treatment was paused, and the patient was allowed to recover, followed by subsequent resumption of the treatment. She was discharged home with instructions for routine use of cold compresses to the face. Within several hours, the patient began experiencing worsening of the cheek pain and new-onset palatal pain, nausea and vomiting, and visible discoloration of the right cheek and frontonasal region. Evaluation by the emergency room physician did not elucidate an underlying diagnosis, and the patient was managed with intravenous morphine, dexamethasone, and ketorolac and discharged home. The following day, the patient noticed worsening skin changes of the right cheek, as well as mucosal discoloration affecting the right hemi-palate (Fig. 1). She denied developing any nasal symptoms and noted no visual or neurological deficits. The patient was managed conservatively with wound dressings by her primary care physician, and she gradually recovered from the injury over several months. She did not return to her injecting practitioner for follow-up evaluation due to personal dissatisfaction with the treatment. She experienced severe maxillary pain for 6 weeks, and superficial necrosis of the right cheek and palatal mucosa, which gradually escharified and desquamated, as well as permanent ciliary madarosis of the upper eyelid. She presented to our clinic 15 months postinjury with persistent mild erythematous skin discoloration of the right cheek managed with three

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**Fig. 1.** Patient's appearance 5 days post injection. A, Livedo reticularis of the right cheek and frontonasal region with central necrotic demarcation of the skin. B, Palatal ulceration following mucosal desquamation.

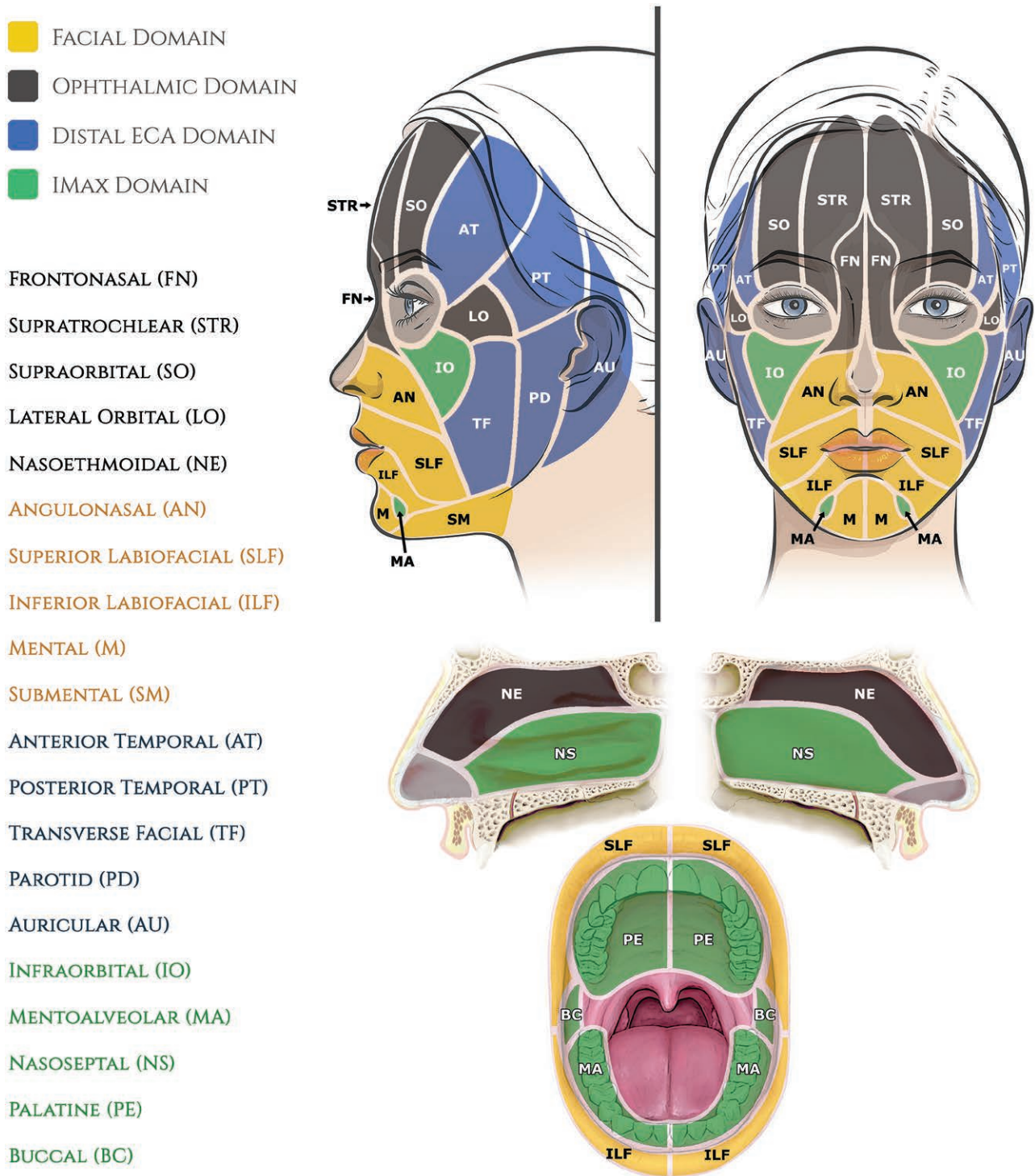
sequential 595-nm pulsed dye laser (Vbeam, Candela Corporation, Wayland, Mass.) monthly treatments with a favorable response and, ultimately, minimally-perceptible scarring. Her palatal mucosal injury healed without permanent sequelae.

## DISCUSSION

The potential ramifications of vascular occlusion within the arterial system of the face span a variety of complications, including tissue necrosis, blindness, and stroke. The risk of neuro-ophthalmological injury is substantially higher over regions supplied by the ophthalmic artery (such as the forehead, glabella, and nasal dorsum) because of its internal carotid artery origin. However, the possibility of substantial occult injury affecting the mucosal lining of the oronasal cavities arising predominantly from vaso-occlusive injuries of the external carotid arterial system have been predicted and included in a newly proposed FOEM (*F*acial, *O*phthalmic, distal *E*xternal carotid, and internal *M*axillary arteries) scoring and grading system of facial necrosis (Fig. 2).<sup>5</sup> The current case report describes the first published instance of hemi-palate necrosis arising from accidental intravascular injection of filler into the cheek. This injury, classified as  $F_0O_1E_0M_2$  (Grade 3A), likely ensued following accidental cannulation of the infraorbital artery, a branch of the distal internal maxillary artery (IMax), resulting in retrograde arterial occlusion of the ipsilateral descending palatine artery.

The IMax demonstrates substantial branching within the infratemporal fossa (Fig. 3), supplying the mucosa of the nonlingual oral surfaces and inferior nasal passages, as well as providing blood flow to the muscles of

mastication and maxillary and mandibular bone and dentition. Despite its numerous branches and nurtured structures, the IMax artery has a limited cutaneous territory, which is supplied by its most terminal branch, the infraorbital artery. The infraorbital vascular territory coincides with the medial cheek fat compartment described by Rohrich and others, and injecting practitioners should recognize this skin region as being linked to the IMax angiosome.<sup>6,7</sup> Due to its limited dermal territory, the IMax angiosome may be at a higher risk of occult necrosis that can be missed by the unsuspecting practitioner. As a result, individuals demonstrating signs of acute vascular occlusion should undergo a complete examination that includes a standard oral and nasal cavity inspection. In addition, due to the presence of true anastomoses between the infraorbital, facial, and dorsal nasal arteries, patients should also be screened for signs and symptoms of visual deficits and stroke through a standard neuro-ophthalmological evaluation and referred to the appropriate level of care, emergently if necessary. Preventive steps to help minimize the risk and extent of vascular injury with calcium hydroxylapatite have been published in several consensus guidelines and include favoring cannula use, limiting bolus size to less than  $0.1\text{ cm}^3$ , and injecting in a slow and retrograde fashion into safe planes of injection such as the preperiosteal plane for deep injections.<sup>8</sup> In addition, avoiding calcium hydroxylapatite injection in high risk areas such as within the ophthalmic cutaneous angiosome, in surgerized tissues, and in areas with tenuous blood supply is advocated. Rapid identification, evaluation, and treatment are critical for minimization of severe sequelae such as skin necrosis and neuro-ophthalmological injury.<sup>9</sup>

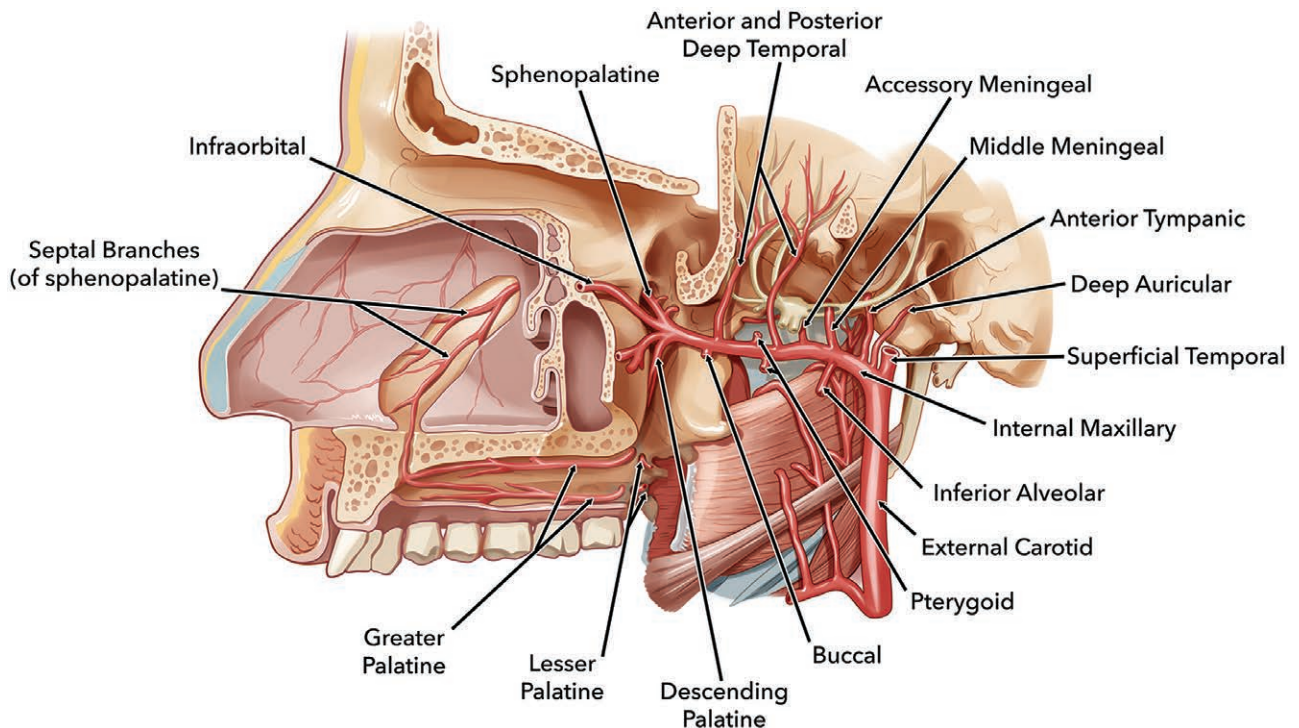


**Fig. 2.** The FOEM scoring system of facial skin necrosis. Each facial domain angiosome (facial, ophthalmic, distal external carotid, and internal maxillary) is subdivided into 10 distinct anatomical facial segments.

### CONCLUSIONS

Acute vascular occlusion secondary to dermal filler injections can result in occult mucosal infarction of the oronasal cavities. In this case report, we describe a patient with undiagnosed palatal necrosis resulting from accidental intravascular injection of dermal filler into

the right infraorbital artery. Practitioners must be mindful of the possibility of vascular occlusion in individuals demonstrating acute severe pain with tissue discoloration and be prepared to conduct a full examination that includes oral and nasal inspections to rule out mucosal necrosis, as well as a neuro-ophthalmological



**Fig. 3.** The anatomy of the internal maxillary artery and its branches, redrawn with permission from Norton NS. Chapter 7: Temporal and infratemporal fossae. In Norton NS (Ed): *Netter's Head and Neck Anatomy for Dentistry*. Philadelphia, PA: Elsevier; 2017:217.<sup>10</sup>

examination to identify any possible retinal or cerebrovascular injury.

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**PATIENT CONSENT**

*The patient provided written consent for the use of her image.*

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