Evaluation of Intraarterial Thrombolysis in Treatment of Cosmetic Facial Filler-Related Ophthalmic Artery Occlusion

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Background: With an increase in recent years in the number of people receiving cosmetic facial injection treatments of hyaluronic acid, the incidence of hyaluronic acid embolism has also increased commensurately. Hyaluronic acid embolism leads to serious complications, including blindness, eye and eyelid movement disorders, skin necrosis, and cerebral embolism. However, there is a lack of robust clinical evidence regarding the benefits of treatment for hyaluronic acid embolism by intraarterial thrombolysis therapy.

Methods: This study included 24 patients with a decrease in visual acuity and other complications induced by facial hyaluronic acid injection. Patients underwent emergency intraarterial thrombolysis therapy by injection of hyaluronidase (500 to 1500 units) alone or hyaluronidase (750 to 1500 units) combined with urokinase (100,000 to 250,000 units), followed in both cases by a general symptomatic treatment and nutritional therapy.

Results: Ten (42 percent) of 24 patients ultimately had improvements to visual acuity, even when the clinical application of the thrombolytic treatments had passed the recommended window for optimal treatment. In all cases, patients' facial skin necrosis was restored to nearly normal appearance. In addition, the authors found that hyaluronidase combined with urokinase was a more effective therapy than hyaluronidase alone.

Conclusions: The authors' results indicate that intraarterial thrombolysis therapy is beneficial to patients suffering from blindness induced by hyaluronic acid embolism. The therapy was shown to be worthy of clinical application because it alleviated the impairment to patients' vision and was also beneficial in the recovery from other serious complications, including eye movement disorder, eye edema, headaches, and skin necrosis. (*Plast. Reconstr. Surg.* 145: 42e, 2020.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

In recent years, hyaluronic acid facial injection has become the most popular cosmetic procedure worldwide because of its advantages as a minimally invasive, low-cost, low-pain treatment with high success in producing visually striking results.[1] Although this procedure is generally safe, sometimes hyaluronic acid injection can lead to several serious complications.[2–4] Some of the minor complications, such as superficial/uneven placement and local swelling, will gradually heal with the degradation of hyaluronic acid or by local hyaluronidase injection. However, the occlusion of arteries in the head and face caused by hyaluronic acid embolism can lead to devastating complications, including blindness, hemiplegia, ocular motive inhibition or fixation, and skin necrosis, which cannot be treated by local hyaluronidase injection alone.[5–7]

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Intraarterial thrombolysis is the most effective treatment for thromboembolisms, although only a few studies have explored the use of intraarterial thrombolysis in treatment of ophthalmic arterial embolism caused by hyaluronic acid injection. To further identify the effect of intraarterial thrombolysis on hyaluronic acid facial embolization, we retrospectively reviewed the cases of 24 patients with severe visual impairment, ocular motive inhibition, ptosis of eyelids, and skin lesions caused by hyaluronic acid facial injections. All patients immediately received emergency intraarterial thrombolysis treatment on arrival at our hospital. In this article, we describe our treatment methods and the effects, which will contribute to the treatment of serious complications caused by hyaluronic acid facial injection.

PATIENTS AND METHODS

We retrospectively reviewed the medical records of 24 patients who were diagnosed with severe visual impairment associated with cosmetic facial hyaluronic acid injections and who underwent intraarterial thrombolysis along with superselective ophthalmic angiography at the Fourth Medical Center of Chinese PLA General Hospital (Beijing, People's Republic of China) from December 1, 2015, to May 31, 2017. On arrival at our hospital, these patients first underwent magnetic resonance imaging or computed tomography for cerebral embolism or cerebral hemorrhage. We then evaluated their ocular function in detail. After these patients were confirmed to have no life-threatening injuries or interventional contraindications, such as hypertension, coagulopathy, intracranial and external hemorrhaging, we immediately performed digital subtraction angiography and intraarterial thrombolysis with written informed consent.

The digital subtraction angiography was performed in the proximal part of the internal and external carotid artery bifurcation by using an angiography machine (FD20; Philips, Amsterdam, The Netherlands). After identification of the poor filling of the ophthalmic artery, the microcatheter [Stride 2.6 Fr (ASAHI, INTECC, Aichi, Japan); Osseoflex SN Steerable Needle (Merit Medical Systems, Inc., South Jordan, Utah); Carnelian MARVEL 1.8 Selective (Tokai Medical Products, Inc., Aichi, Japan)] was extended to the proximal ophthalmic artery. After identifying the occlusion of the ophthalmic artery again by angiography, thrombolytic agents, hyaluronidase or hyaluronidase with urokinase, were slowly injected into the ophthalmic artery. Subsequently, we performed mechanical recanalization using microguidewire (Streaming 0.014 inch, 0.018 inch microguidewire; ASAHI INTECC). The hyaluronidase dosages ranged between 750 and 1500 U, and the urokinase dosages ranged between 100,000 and 250,000 U.

On hyaluronic acid embolization, we immediately gave the patient oxygen inhalation. The primary injected region was given multiple injections of hyaluronidase to dissolve the hyaluronic acid that accumulated under the skin and to reduce the local tension. In the early stage of embolization, local tissue edema is prominent. In this stage, the symptomatic treatments we applied were as follows: glucocorticoid pulse therapy [methylprednisolone sodium succinate, first day 1000 mg, second day 500 mg, third day 500 mg, intravenous drop (>30 minutes)], dehydration treatment [mannitol, 125 ml (25 g), intravenous drop, every 6 hours; melilotus extract tablet, 50 to 100 mg administered orally, three times per day], and neurotrophic treatment (mouse nerve growth factor for injection, 20 μg, intramuscular injection every night; mecobalamin injection, 0.5 mg, intravenous injection, every day for 90 days); temple injection of compound anisodine hydrobromide 2 ml, everyday.

A few individual patients received treatments of retrobulbar injections depending on their specific conditions, including retrobulbar injection of tobramycin 20 mg and dexamethasone 2.5 mg. According to the condition of conjunctival edema and corneal injury, we selectively used prednisolone acetate ophthalmic suspension eye drops, levofloxacin, sodium hyaluronate eye drops, and deproteinized calf blood extract eye gel. We did not use aspirin or heparin, antiplatelet, or other anticoagulant drugs.

These patients' hospital stays ranged from 12 to 85 days, with the average period being 28 days. Patients were subsequently followed for 1 month to 1 year, with an average follow-up of 3 months.

RESULTS

Demographics

Demographic and clinical characteristics examined in this study are summarized in Table 1. We included in this study 24 patients with hyaluronic acid occlusion of the ophthalmic artery after cosmetic facial injection. There were 23 young women and only one man (mean age, 26 years). All of the 24 patients received facial injections, and all of them had unilateral impaired

Table 1. Demographic and Clinical Characteristics

Patient	Sex	Cosmetic Injection Site	Eye Site	Initial Visual Acuity	Final Visual Acuity	Time to First IAT (hr)	Thrombolysis (U)	Time to Secondary IAT (hr)	Ptosis	Ocular Motility Disorders Before/After	Skin Necrosis
1	F	Nasion	R	LP	HM	168	Hyaluronidase 1500 plus urokinase 125,000	24	Yes	+++/+	Yes
2	F	Nasion	L	NLP	LP	2	Hyaluronidase 1000 plus urokinase 125,000	24	Yes	+++/+	Yes
3	F	Frontal	L	NLP	NLP	27	Hyaluronidase 750 plus urokinase 125,000	No	Yes	+++/+	Yes
4	F	Frontal	L	NLP	NLP	17	Hyaluronidase 1000 plus urokinase 125,000	No	Yes	++/+	No
5	F	Nasion	R	LP	20/200	6	Hyaluronidase 1000 plus urokinase 125,000	No	Yes	++/+	Yes
6	F	Temporal	R	NLP	20/50	25	Hyaluronidase 1000 plus urokinase 125,000	No	Yes	−/−	No
7	F	Frontal	L	NLP	20/133	16	Hyaluronidase 1500 plus urokinase 250,000	No	Yes	+/−	No
8	F	Nasion	L	LP	20/50	26	Hyaluronidase 1500 plus urokinase 125,000	No	Yes	+/−	Yes
9	F	Frontal	L	NLP	NLP	51	Hyaluronidase 750 plus urokinase 125,000	No	Yes	+++/+	Yes
10	F	Frontal	R	NLP	NLP	22	Hyaluronidase 1000 plus urokinase 125,000	No	Yes	+++/+	Yes
11	F	Frontal	L	NLP	NLP	19	Hyaluronidase 1000 plus urokinase 125,000	No	Yes	++/+	Yes
12	F	Frontal	L	NLP	NLP	46	Hyaluronidase 1500 plus urokinase 125,000	No	Yes	++/+	Yes
13	M	Frontal	L	NLP	NLP	75	Hyaluronidase 1000 plus urokinase 100,000	No	Yes	++/+	Yes
14	F	Nasion	L	NLP	NLP	20.5	Hyaluronidase 1500	48	Yes	+/−	Yes
15	F	Glabella	L	LP	HM	24	Hyaluronidase 1500	No	Yes	++/−	Yes
16	F	Nasion	L	LP	20/40	144	Hyaluronidase 1500	No	Yes	+/−	Yes
17	F	Nasion	R	NLP	20/50	24	Hyaluronidase 1500	No	Yes	++/−	Yes
18	F	Nasion	R	NLP	NLP	24	Hyaluronidase 1500	No	Yes	+/−	Yes
19	F	Nasion	R	NLP	NLP	32	Hyaluronidase 1500	No	Yes	+/−	Yes
20	F	Nasion	R	NLP	NLP	36	Hyaluronidase 1500	No	Yes	−/−	No
21	F	Nasion	L	NLP	NLP	100	Hyaluronidase 1500	No	Yes	+++/+	Yes
22	F	Frontal	R	NLP	LP	14	Hyaluronidase 1500	No	Yes	++/+	Yes
23	F	Nasion	R	NLP	NLP	24	Hyaluronidase 500	No	Yes	++/+	Yes
24	F	Frontal	L	NLP	NLP	48	Hyaluronidase 800	No	Yes	+++/+	Yes

IAT, intraarterial thrombolysis; R, right; L, left; NLP, no light perception; LP, light perception; HM, hand motion; −, normal eye movement; +, eye movement slightly restricted; ++, eye movement significantly limited; +++, eyeball fixed, eye movement basically disappeared.

vision, with 10 right eyes and 14 left eyes affected. Hyaluronic acid was most commonly injected into the nasion area [12 of 24 (50 percent)], which leads to ophthalmic artery occlusion. The second-ranked area is the frontal [10 of 24 patients (42 percent)], followed by glabella (one patient) and temporal (one patient). Before coming to our hospital, 20 of 24 patients (83 percent) had gone to other hospitals and received treatment with vasodilatory agents, glucocorticoid therapy, dehydration, and neurotrophic drugs, but without obvious improvement to visual acuity. Following their initial treatments, these patients were admitted our hospital and received intraarterial thrombolysis therapy. Four patients came directly to our hospital from the onset of symptoms and received emergency intraarterial thrombolysis therapy along with other symptomatic treatments.

Clinical Manifestations

Twenty-one of 24 patients (88 percent) presented a severe decrease in visual acuity or blindness during or after hyaluronic acid injection, combined with weakness in opening of their eyes, dizziness, nausea, vomiting, severe headache or ocular pain, and skin numbness. Syncope and loss of consciousness for a few minutes occurred in one patient but without intracranial embolism as assessed by means of examination. There were two patients who presented no headaches or eye pain, which was a painless loss of sight. In visual impairment, 19 patients showed ablepsia (no light perception) in their first visit to our hospital, and five patients presented as having light perception. All of the patients presented mydriasis with pupil diameter larger than 5 mm. All of the patients presented ptosis, and 22 patients presented ocular

motility disorders. Twenty patients showed skin lesions in the corresponding region of artery occlusion, which presented as pale, piebald, or necrotic.

Analysis of Therapeutic Effect of Intraarterial Thrombolysis

After intraarterial thrombolysis therapy, recanalization of the ophthalmic artery and its branches can be clearly observed by digital subtraction angiographic imaging (Fig. 1). The improved retinal blood supply and arterial recanalization were observed by fundus color photography (Fig. 2). Ten of 24 patients (42 percent) had improved visual acuity after treatment. Whether the initial visual acuity was diagnosed as no light perception or light perception, the final vision of these 10 patients improved to varying degrees.

Urokinase plus Hyaluronidase versus Hyaluronidase

There were 13 patients who received intraarterial thrombolysis of hyaluronidase (750 to 1500 U) and urokinase (100,000 to 250,000 U), and six patients (46 percent) had enhancement of visual acuity. There were 11 patients who received intraarterial thrombolysis of hyaluronidase (500 to 1500 U) alone, only four of which (36 percent) had visual acuity enhancement following treatment. According to these data and our treatment experience, we suggest that hyaluronidase combined with urokinase may have a better thrombolysis effect on hyaluronic acid embolism.

Time to Intraarterial Thrombolysis

In these 24 patients, the period from the onset of symptoms to intraarterial thrombolysis therapy ranged from 2 hours to 7 days (mean, 46.3 hours; median, 24.5 hours), some of which had passed the optimal time for intraarterial thrombolysis. Two patients received ophthalmic artery intraarterial thrombolysis therapy within 6 hours of the hyaluronic acid injection, and both of them presented improvement in visual acuity. Among the 10 patients who received intraarterial thrombolysis within 7 to 24 hours after the hyaluronic acid injection, only four patients showed improvement in visual acuity. Eight patients received intraarterial thrombolysis within 2 to 3 days of hyaluronic acid injection, and two patients presented visual acuity improvement. Four patients received intraarterial thrombolysis more than 3 days after the hyaluronic acid injection, and two of these patients demonstrated improved visual acuity; one of these two patients whose visual acuity was increased from light perception to hand motion had received therapy more than 7 days after hyaluronic acid injection, whereas the other patient received therapy approximately 6 days after hyaluronic acid injection, and their visual acuity increased from light perception to 20/40. It is generally believed that the earlier the thrombolysis treatment can be administered, the greater the improvements to visual acuity, which is consistent with our statistical results.

Secondary Embolization

Three patients suffered from a secondary embolization with sudden headache, ocular pain, and decline in vision on the first or second day after the first intraarterial thrombolysis therapy. We immediately performed the therapy again, and all of these three patients were relieved of their clinical symptoms and experienced

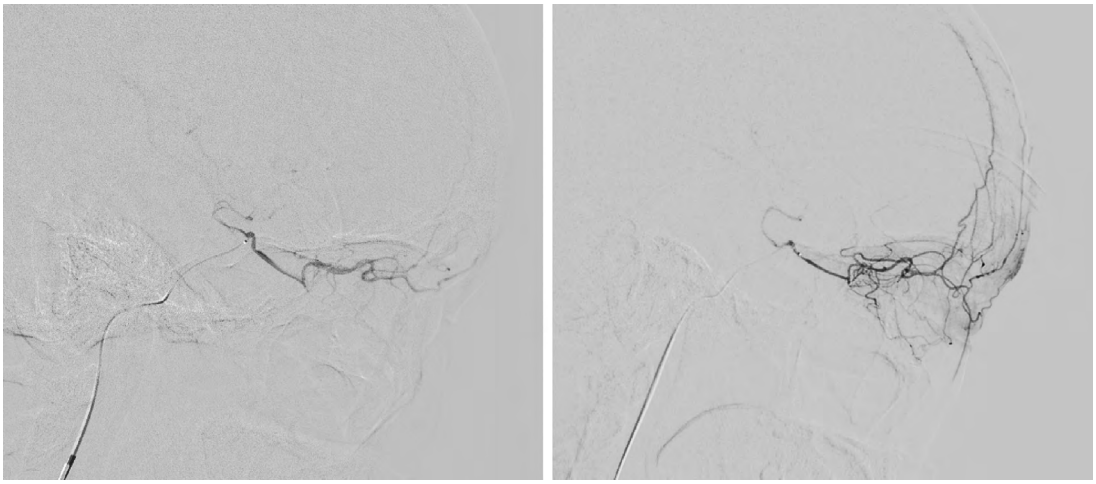

Fig. 1. (*Left*) Arterial embolization of the ophthalmic artery and its branches. (*Right*) Recanalization of the ophthalmic artery and its branches.

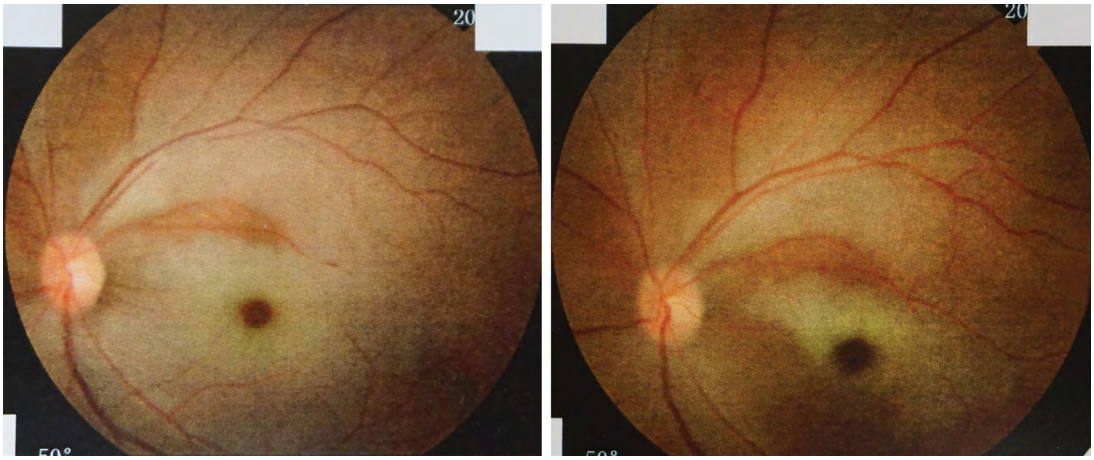

Fig. 2. Fundus photographs of a hyaluronic acid–injected patient before and after intraarterial thrombolysis. (*Left*) Before intraarterial thrombolysis, fundus photograph revealed segmented and attenuated retinal vessels, and a distinctly edematous retina. (*Right*) After intraarterial thrombolysis, the retinal vessels were well reperfused. The blood supply to the retina was adequate for recovery and the edema disappeared.

improvements to their vision. However, following the second therapy, the recovery of visual acuity was less successful than after the first therapy. We will describe this in detail in a typical case below.

Other Complications

Superselective ophthalmic artery intraarterial thrombolysis can recanalize blood vessels and improve many symptoms. Some patients even feel ocular ease during treatment. After intraarterial thrombolysis, the ptoses in 24 patients were all healed. Partial or total ocular motility limitation of the involved eye was ameliorated to different degrees in 22 patients; the specific outcome was eight patients healed and 14 patients ameliorated. Intraarterial thrombolysis therapy significantly improved skin necrosis and skin ecchymosis, and nearly restored the patients' appearance to normal, leaving only some superficial scars in several patients. The amelioration of these complications provided an almost normal appearance for the patients, with a severe decrease in visual acuity, which was of great importance for their psychological rehabilitation.

A Typical Patient

There was one patient who received intraarterial thrombolysis therapy twice, with the first therapy at 168 hours after hyaluronic acid embolization. This patient was injected with hyaluronic acid at the root of the nose for rhinoplasty. Her initial thromboembolic symptoms included eye pain, nausea, vomiting, and even loss of consciousness for several minutes. She received a general treatment of glucocorticoid, vasodilatory agents, and anticoagulant agents in the first hospital in which she was treated, but without obvious symptomatic remission. Seven days after the symptom onset, she came to our department with severe symptoms as shown in Figure 3, *above*. The vision in her right eye decreased to light perception. Her right eye presented a complete ptosis, eyeball fixation, corneal and conjunctival hyperemia, and edema. There was skin ecchymosis in the right frontal and the upper eyelid, in addition to skin necrosis and a scab around the right inner canthus. On arriving at our hospital, we immediately provided intraarterial thrombolysis treatment in addition to general treatment. Treatment increased the blood supply to the ophthalmic artery and recanalization of the peripheral branches. The patient felt that her headache and ocular discomfort were significantly improved postoperatively and the vision restored to hand motion. However, on the first day after treatment, she felt a sudden and intensified headache with ocular pain. Her vision decreased to no light perception, so we immediately performed the second intraarterial thrombolysis therapy. A secondary occlusion was revealed by digital subtraction angiography (Fig. 3, *below*, *left*) and we subsequently administered another intraarterial thrombolysis treatment (Fig. 3, *below*, *right*). Finally, her visual acuity improved from light perception (vision status when admitted) to hand motion (vision status following treatment). Similarly, ptosis of the eyelid was not observed after treatment, the cornea was transparent, and the conjunctival edema disappeared. Her eye movement was essentially recovered to normal but with minimal strabismus. The skin lesions were completely healed, leaving only small, superficial scars.

Fig. 3. The clinical manifestation of a typical patient before and after intraarterial thrombolysis. (*Above*) Physical examination at admission: visual acuity was light perception, complete ptosis of the right eyelid, eyeball fixation, corneal edema, conjunctival edema, skin ecchymosis in the right frontal and the upper eyelid, and skin necrosis and scab in the upper eyelid inner canthus. (*Below*, *left*) After the second intraarterial thrombolysis, the blood supply in her forehead was restored, the skin lesion was obviously improved, and the right ptosis was relieved. (*Below*, *right*) At the time of discharge, her skin lesions were completely healed, leaving only small, superficial scars. Her final vision was hand motion with no ptosis, the cornea was transparent, the conjunctival edema disappeared, and her eye movement essentially recovered to normal but with a little strabismus.

DISCUSSION

The facial filler injection of hyaluronic acid is a minimally invasive procedure frequently used in cosmetic procedures. Complications from this procedure are rare, but the most serious complications from this procedure have been reported to include embolization, leading to blindness, eye movement disorders, skin necrosis, cerebral ischemic events, and even death.[4,7]

There are many reasons for hyaluronic acid embolization and the hypothesis of retrograde embolization is widely accepted. During the process of hyaluronic acid injection, an imprecise puncture could result in hyaluronic acid entering blood vessels. Because of the higher local injection pressure, retrograde flow of hyaluronic acid will pass into the superior blood vessels. When the injection pressure becomes lower than the blood pressure, hyaluronic acid moves along with the flow of blood to inferior vessels and finally results in vascular embolization with corresponding symptoms. The complications induced by facial hyaluronic acid injection are mainly caused by ophthalmic artery embolism, the anatomical

mechanism of which is the anastomoses among the ophthalmic artery and the arteries in injection regions. Therefore, a previous study had indicated that hyaluronic acid injections into the glabellar region, nasal dorsum, and nasolabial fold near the eyes were not advised.[8] Our results also demonstrated that the nasion is the most dangerous area for cosmetic filler injection.

Intraarterial thrombolysis is thought to be an effective method of eliminating embolus. However, previous studies reported an unsatisfactory curative effect of intraarterial thrombolysis on hyaluronic acid embolization,[9,10] which led to a skeptical attitude about the beneficial effects of intraarterial thrombolysis therapy. However, in this study, 10 of 24 patients (42 percent) had clear improvements in visual acuity after intraarterial thrombolysis therapy. The previous study, which found limitations in the effect of intraarterial thrombolysis on hyaluronic acid–associated ophthalmic artery occlusions, reviewed only four patients.[10] In our study, there were 14 patients whose vision also failed to improve through this treatment. However, we could not conclude that intraarterial thrombolysis is ineffective for treating hyaluronic acid–associated ophthalmic artery occlusions.

In terms of thrombolytic drugs, we found that the thrombolytic effect of hyaluronidase with urokinase was distinctly better than injecting hyaluronidase alone, which is a drug used specifically for the treatment of thromboembolus. According to this result, we speculate that hyaluronic acid embolus may lead to the formation of thromboembolus in the ophthalmic artery, although this conclusion needs to be further verified.

As for the period between hyaluronic acid injection and intraarterial thrombolysis therapy, our results showed that the earlier the intraarterial thrombolysis procedure was performed, the higher the likelihood of vascular recanalization and improvement in vision. It is worth noting that there were two patients who experienced a long-term embolization (6 days and 7 days) before intraarterial thrombolysis therapy; however, they also presented vision improvement in the end. On arriving at our hospital, these two patients were still light-sensitive, which indicated that some of the retinal nerve cells were still alive. Also, during the intraarterial thrombolysis procedure, we found that the ophthalmic artery and retinal arteries were not completely occluded (Fig. 4, *above*, *left*), which served as a basis for their vision improvement. When the ophthalmic artery is recanalized after intraarterial thrombolysis therapy, we continued treatment of these patients with drugs for glucocorticoid, dehydration, neurotrophic, and other general symptomatic and nutritional therapies, which distinctly alleviated the tissue edema and inflammation and ultimately contributed to the survival of the endangered visual cells and their vision improvement. Although there were no hemorrhagic complications in these two patients, it is important to note that thrombolysis by urokinase beyond the traditional time window could markedly increase the risk of bleeding, and close attention should be paid during treatment to avoid this outcome.

In addition, the secondary embolization occurred in three of these 24 patients, which may have been caused by the rapid blood flow after recanalization moving some incompletely dissolved minor hyaluronic acid embolus to the distal arteries. It is therefore suggested that after intraarterial thrombolysis therapy, the patient's condition should be observed carefully, especially if symptoms include a headache, eye pain, or vision decline. In these cases, the doctors should consider the possible occurrence of secondary embolization and timely performance of a repeated treatment with digital subtraction angiography and intraarterial thrombolysis therapy. Thus, based on our experience, we strongly suggest close observation and possibly a second intraarterial thrombolysis treatment within at least 2 days after the initial treatment.

The facial vascular recanalization by intraarterial thrombolysis therapy not only improved vision but also alleviated other complications, including eye movement disorders, ocular pain, and skin necrosis, which is attributable to the increased blood supply. Undeniably, intraarterial thrombolysis is the most important treatment measure; however, the general symptomatic therapies are also necessary for the patient's recovery. Generally, these symptomatic therapies include vasodilator drugs, neurotrophic medicine, anticoagulants, glucocorticoids, anterior chamber puncture, retrobulbar injection, eyeball massage, hyperbaric oxygen, and others.[4,5,7] However, in our treatment, we used only some of the therapies to treat our patients based on their conditions. According to our experience, early use of glucocorticoid and dehydrating drugs is an effective way of postponing the deterioration of the patient's illness. The early use of high-dose glucocorticoid shock intravenous systemic medication could control the inflammatory response and reduce tissue edema, which alleviates the symptoms of tissue ischemia and necrosis. Mannitol and melilotus extract

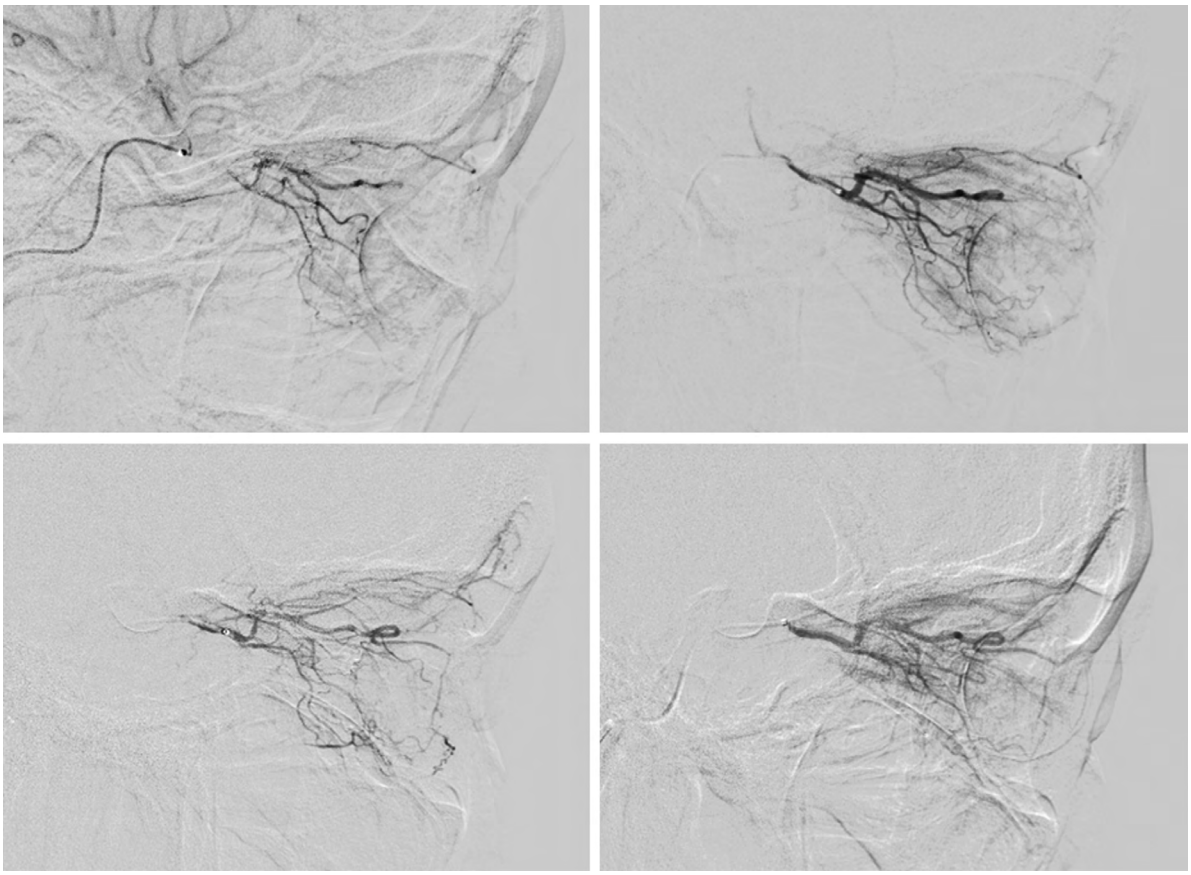

Fig. 4. A typical patient with secondary embolization. (*Above*, *left*) Before the first intraarterial thrombolysis, digital subtraction angiography showed that the ophthalmic artery and its branches were decreased, and the choroid filling ring was attenuated. (*Above*, *right*) After the first intraarterial thrombolysis, digital subtraction angiographic imaging revealed enlarged and numerous branches of the ophthalmic artery and a clearer ring around the eye. (*Below*, *left*) Before the second intraarterial thrombolysis, digital subtraction angiography showed that the blood flow to the eyeball was compromised again, the recanalized vessels were attenuated and segmented, and the choroidal filling was also markedly decreased. (*Below*, *right*) After the second intraarterial thrombolysis, the perfusion of the occluded ophthalmic artery and its branches was improved. However, the recanalization was not as good as the first time intraarterial thrombolysis, as shown (*above*, *right*).

tablets were all used to reduce tissue edema. In addition, oxygen inhalation and neurotrophic drugs may contribute to protecting the injured retinal nerve cells. Also, the use of topical eye treatment is decided by ophthalmologists according to the patient's condition. Besides, in the early stage of hyaluronic acid embolization, patient skin has excessive tension because of subcutaneous filling and edema, which resulted in piebald skin and local necrosis. Hyaluronidase has the ability to dissolve hyaluronic acid,[11,12] and has been approved by the U.S. Food and Drug Administration as a dispersion agent, and temporarily modifies the permeability of connective tissue through the hydrolysis of hyaluronic acid.[13] Multiple injections at local intervals of hyaluronidase can effectively dissolve subcutaneous injected hyaluronic acid, thus reducing the subcutaneous tension and relieving tissue compression. In our treatment, the combined intraarterial thrombolysis therapy with general symptomatic and local treatments led to almost complete healing of the skin ecchymosis and necrosis and eye symptoms in most of the patients, which rebuilt their confidence, especially for those who had lost vision or had no vision improvement.

We sum up our experience as follows: (1) timely intraarterial thrombolysis therapy is effective for facial hyaluronic acid injection–associated ophthalmic artery occlusions; (2) the earlier the treatment was performed, the higher the possibility of vision improvement; (3) combining the use of hyaluronidase and urokinase had a better thrombolytic effect than using hyaluronidase

alone; (4) doctors should carefully observe the patient's conditions for the first 2 days after intraarterial thrombolysis because of secondary embolization, and if necessary, intraarterial thrombolysis should be performed again; (5) adjuvant therapies including early hormone shock, local injection of hyaluronidase, oxygen inhalation, and neurotrophic drugs are necessary. According to our study and experience, we recommend intraarterial thrombolysis therapy as an effective method to treat patients with devastating complications induced by facial hyaluronic acid injection.

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PATIENT CONSENT

The patient provided written consent for the use of her images.

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