

## C A S E R E P O R T

# Vascular occlusion of the facial transverse artery after hyaluronic acid filler injection. A case report and 8-step protocol for treatment of acute vascular complications

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**Abstract.** Nowadays, dermal fillers are increasingly used for facial rejuvenation and soft tissue augmentation to counteract skin ageing. Even with good anatomical knowledge of the injectors, complications are being observed after the application of volume enhancer products. This study aims to report a case of acute vascular occlusion after hyaluronic filler injections in the sub-malar area of the face. A short overview of possible side effects and a simple treatment protocol are also presented.

**Key words:** hyaluronic acid, vascular occlusion, fillers

## Introduction

A wide variety of dermal fillers is now available in the aesthetic dermatology field for restoration of lost volume. Fillers are divided according to the substance they are made of. Hyaluronic acid (HA) fillers are by far the most popular type of filler. HA is a linear polysaccharide, composed of repeating disaccharide units of glucuronic acid and N-acetylglucosamine<sup>1</sup>. It naturally exists in the skin and is a key component in the skin's ability to retain water for a plump, hydrated complexion<sup>2</sup>. HA based fillers differ depending on the degree of crosslinking, HA concentration, ratio of high and low molecular weight, cohesivity and gel hardness<sup>3</sup>. Regardless of the product type, with the increasing usage of fillers, side effects become more common. HA filler complications vary and range depending on the mechanism and time of appearance. They can be classified into: mild and severe, early and delayed, product and technique related, inflammatory and noninflammatory. According to the data from the latest studies, less than 0,05% of filler injections can result in vascular complications. They can occur due

to the use of any product. A regular cosmetic doctor, performing 1500-2000 treatments a year will meet a vascular adverse event every 3-4 years<sup>4</sup>. Here we describe a case of a vascular occlusion of the transverse facial artery after a HA filler injection, which is a complication with an incidence of less than 0,01%. A short protocol for treating skin necrosis after vascular accidents is also presented. The case is presented after an informed consent has been provided by the patient.

## Case report

A 40-year-old woman came to the clinic with progressively worsening purple discoloration and erythema engaging the buccal area of the face three days after receiving 1 ml HA filler (17mg/ml) injected in her right submalar area with 22G 50 mm cannula. The volume of the product was 0.5ml per side. The entry point for the cannula was on the jawline level, 1mm medially to where the facial artery is usually located, or in front of the anterior border of the masseter muscle. During the procedure no significant pain was reported.

According to her medical history, she had not received this particular filler - Juvederm Volift with Lidocaine 1ml in the past. The patient's vital signs at presentation were normal. A clinical examination reported a well-defined livedo reticularis engaging the submalar area. White pustules were also visible. The capillary refill was minimal at the affected site and pain was reported (Figure 1).

Bacterial swabs showed a negative result. Laboratory evaluation - all within normal limits. A 2-mm punch biopsy was obtained, showing early signs of tissue necrosis, dissolution of cellular architecture, swollen keratinocytes. The patient was diagnosed both clinically and with the use of an ultrasound with acute vascular occlusion, engaging the right transverse facial artery (Figure 2).

On the first day of the symptoms onset, the patient was treated with 150 units of hyaluronidase (Hylase "Dessau" 150 I.E.), injected with a needle throughout the affected area. No significant improvement was reported. She received 300 Units of hyaluronidase on the second day, followed by 600 units on the

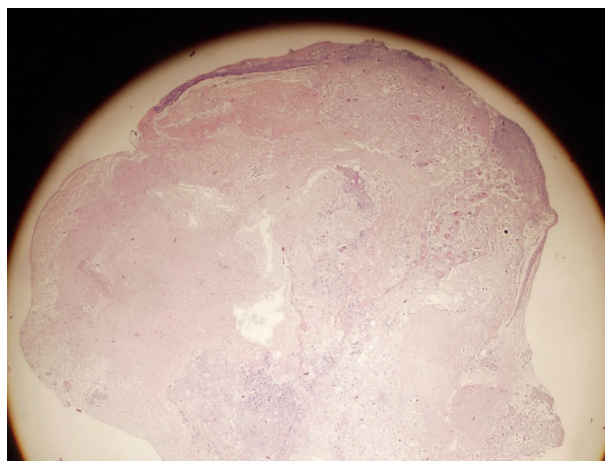
third day. The photos (Figures 3 and 4) below show the traumatized skin of the patient as a result of multiple dissolving injections. The patient presented with redness and brownish crusts covering an ulcer-like defect.

Ciprofloxacin 2x500mg for 20 days, Pentoxifyllin 3x 400mg for 7 days, Aspirin 325mg on the first day, followed by 75 mg per day and Methylprednisolone tapering schedule were introduced to her treatment plan for 7 days. Seven days after the injection of hyaluronic acid filler, the patient received a hyperbaric oxygen treatment. She was subjected to 2,4 atm of pressure in a multi-place chamber with 100% inhalation for 90 minutes. The patient received 10 sessions of oxygen therapy followed by multiple PRP (platelet-rich plasma) treatments. Part of the double-concentrated plasma was injected directly in the skin and part was used for a topical firm massage, combined with multiple microneedling procedures due to hyperpigmentations and scarring. On the 3-month follow-up the patient showed significant improvement of the skin in the affected area. Pain disappeared, discoloration resolved and tissue healed.

Six months after the patient recovery, a direct ultrasound examination showed complete vascular patency. As a conclusion, the low dose of hyaluronidase injected into the patient during the first 2 days of the symptom's onset was one of the crucial reasons for the difficult and late full recovery. Practitioners must remember that this is a time-crucial event, and test-patching is not required if hyaluronidase is used for



**Figure 1.** The patient two days post-treatment with hyaluronic acid fillers.



**Figure 2.** Early sign of tissue necrosis.



**Figure 3.** Ulcer-like defect covered by brown crusts.



**Figure 4.** Three months after recovery treatment.

the treatment of vascular occlusions, as the risk of tissue damage is higher than the risk of an anaphylactic reaction.

### Discussion

Certain areas of the face are called “danger zones” due to presence of anatomical structures like vessels and nerves. Vascular occlusion occurs when blood is no longer able to pass through a blood vessel<sup>4</sup>. It may be caused by an internal obstruction, due to direct intra-arterial injections of a product, or it may be the result of external compression<sup>5</sup>. If left untreated, vascular occlusion can rapidly progress to serious complications such as tissue necrosis, orbital pain or irreversible vision loss. The transverse facial artery is one of the key vessels to avoid in the mid face area. Its anatomy makes it vulnerable to vascular complications from filler injections. The artery arises from the superficial temporal or external carotid artery that runs between the zygomatic arch and parotid duct. It supplies the parotid gland and duct, the orbicular muscle, masseter muscle and the skin<sup>6</sup>. There are three types of transverse

facial arteries. Type I is a short artery that does not extend beyond the masseter muscle. Type II runs to the nasolabial fold and anastomoses to the facial artery. Type III is an artery that substitutes the hypoplastic facial artery, continues as the angular artery and then anastomoses to the dorsal nasal artery<sup>7</sup>.

When the diagnosis has already been made, there are several basic rules that must be followed in order to achieve a rapid tissue recovery. In this paper, we present our short 8 step protocol for early and late treatment of tissue necrosis after vascular complications.

1. Hyaluronidase injection. Hyaluronidase is an enzyme that degrades hyaluronic acid fillers<sup>8</sup>. Hyaluronidase 1500 Units vial in 3 ml saline must be injected with needle or cannula after clear disinfection and marking of the ischemic area<sup>9</sup>. About 500 Units of hyaluronidase per 6 square centimeter must be injected within minutes to hours, not only where the filler was injected but in the whole area of compromised skin and over the course of the affected vessel. However, in practice, the appropriate amount of hyaluronidase varies based on different factors and may differ<sup>10</sup>.
2. Heat and firm massage. Applying heat on the affected area and a careful, slight massage may help for vasodilatation and mechanical disruption of the filler.
3. Aspirin 325mg. We suggest 325mg under the tongue immediately and then 75mg/ daily until full tissue recovery in order to limit platelet aggregation.
4. Corticosteroids. We recommend a tapering course with Prednisolone 25-40 mg/ per day for 3-4 days to reduce tissue edema. IM application of Methylprednisolone is also possible.
5. Oral antibiotics. In the area of necrotic skin, the higher concentration of dead cells can result in secondary skin infection. The treatment of bacterial infections of the soft tissue with Ciprofloxacin 500mg tablets- b.i.d. is well tolerated and gives good results.
6. Pentoxifylline. Pentoxifylline- 400mg three times daily for an accelerated healing of soft tissue necrosis by improving erythrocyte flexibility and increasing tissue oxygen levels<sup>11</sup>.
7. Hyperbaric oxygen therapy. Several publications describe significant improvement in tissue revascularization after necrosis due to aesthetic procedures. 10 sessions of 100% oxygen for 90 min, at 2,5 atm absolute pressure can be recommended in the case of skin necrosis due to cosmetic treatments.
8. Double-dose platelet-rich plasma treatment. PRP treatment is a safe, affordable and minimally invasive procedure. The prepared plasma has a higher platelet concentration due to normal plasma. We recommend 10cc of blood to be drawn into an 11 cc PRP tube and spun for 10 minutes in a centrifuge to separate the red blood cells from the platelets and plasma. Around 7 cc of plasma can be obtained. The platelet-poor plasma must be removed, and the remaining plasma must be re-suspended to produce super-concentrated PRP suspension. Calcium gluconate 0,6cc can be added to activate the platelets. The platelet rich plasma can be both injected under the affected area and dripped on the skin surface and massaged<sup>12</sup>. The face should be washed in not less than 4 hours.

## Conclusion

The reported case illustrates severe complications after the application of volume enhancer product made of Hyaluronic acid due to acute vascular occlusion of the facial transverse artery. Vascular accidents are rare, but still a risk, associated with the use of fillers for soft tissue augmentation. In general, these side effects are considered as emergency and the sooner the treatment starts, the better is the outcome. Every practitioner should be aware of the treatment protocols for acute and late vascular occlusion. Good anatomy knowledge is crucial and can minimize the risk of side effects.

**Informed Consent:** Written informed consent was obtained from all concerned patients.

**Conflict of Interest:** The authors declare no conflict of interest.

**Funding:** The authors received no financial support for the research, authorship and publication of this case report.

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Received: 25 December 2023

Accepted: 20 May 2024

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