

Hyperbaric oxygen therapy for treatment of a late presenting ischaemic complication from hyaluronic acid cosmetic filler injection

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SUMMARY

Vascular compromise and resulting ischaemic injury are known rare complications of cosmetic filler injections. Most hyaluronic acid vascular compromises present early and can be treated effectively by hyaluronidase. Here we present a case of ischaemic wound and mucosal necrosis after cosmetic facial hyaluronic acid injection that appeared within hours of injection but was not diagnosed and treated for 5 days. At day 5, the patient was treated with hyaluronidase injection immediately followed by 14 sessions of daily hyperbaric oxygen therapy (HBOT). Despite the delayed treatment, the patient had essentially complete recovery and the hyperbaric therapy was overall well-tolerated. Our case report suggests that hyaluronidase injection with concurrent daily HBOT sessions may be effective to allow recovery from late-presenting filler ischaemic complication. Furthermore, given the safety profile of HBOT, we suggest a more deliberate approach to this modality as a therapeutic adjunct by cosmetic practitioners when similar complications arise.

BACKGROUND

Non-permanent fillers such as hyaluronic acid and calcium hydroxyapatite are commonly used for facial cosmetic procedures. While the risk of serious complications is very low, severe complications in the form of vascular occlusion may lead to tissue compromise or vision loss.^{1–3} Proposed treatment modalities vary in the literature and depend on the duration of occlusion (early vs late presentation). Most hyaluronic acid vascular compromises present early and are often effectively treated by hyaluronidase. This approach is reflected in a treatment algorithm based on the review of the literature for hyaluronic acid complications by DeLorenzi and Aviv *et al.*^{4,5} Loghem and colleagues have offered expert opinion regarding treatment of vascular complications for calcium hydroxyapatite injections.⁶ Overall, the management options emphasise early recognition, specialist assessment, and may include the use of vasodilators, systemic steroid, antiplatelet agents, antibiotic, wound care and hyperbaric oxygen among others.^{4–6}

While these complications are devastating, the current body of evidence relies only on case reports and short case series. Late diagnosis and treatment of occlusive events are even more scarce in the literature.

Furthermore, despite the longstanding safety of hyperbaric oxygen therapy (HBOT), studies that

mention the use of HBOT to treat vascular occlusion after filler injection often provide little information about the details of the HBOT administration. For example, the timing of initiation of HBOT, its duration or the protocol itself is often not discussed by authors. Yet, without these details, clinicians cannot make evidence-based informed decisions to optimise future patients presenting with vascular occlusion after filler injection. We aim to discuss these details in a case where the presentation and treatment was delayed by 5 days. Ongoing contribution to the sparse body of the evidence would emphasise the need for investigating this treatment modality as a viable tool and further highlight the practical considerations of instituting HBOT. We present this report with adherence to CARE case report guidelines.⁷ Signed informed consent to publish this case report was obtained from the patient.

CASE PRESENTATION

Our patient was a woman in her mid-50s who received hyaluronic acid injection, JUVÉDERM Ultra Plus XC (Allergan, Irvine, California, USA), to nasolabial folds bilaterally and chin for cosmetic reasons. She developed pain and discomfort on the left side on the same day which was initially attributed to an expected trivial ‘bruise’ of the injection after a telephone discussion between the patient and the nurse injector. The volume of the filler injected at this site was 0.6 mL across two injection sites. The patient started using acetaminophen and codeine for analgesia. She subsequently developed worsening pain and skin ulceration and presented to her local rural emergency department 4 days later (day 5 postinjection). An urgent opinion from a cosmetic physician in the closest urban centre was requested and the patient was diagnosed with vascular compromise of her left angular artery related to the filler injection. On physical examination, she had localised swelling, erythema, small vesicles and ulceration near the nostril as well as an area of necrosis on the upper lip mucosa (*figure 1*). She did not have any systemic infectious symptoms. The review of system was otherwise unremarkable. She did not have any significant medical history and was not on any medications at home. She did not have any known allergy.

TREATMENT

On day 5 post filler injection, the patient received a 5 mL injection of hyaluronidase (150 mg/mL) into the left nasolabial fold and the upper lip. Typically,



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Figure 1 Five days after injection of hyaluronic acid and prior to initiation of hyperbaric oxygen therapy.

a higher dose would be preferred, however, patient was unable to tolerate this due to discomfort. Cephalexin 500 mg QID per os and Valacyclovir 1 g two times a day per os were commenced for a period of 10 days. An urgent referral was made for HBOT. At our centre 24-hour access to hyperbaric chamber is possible through a triage system. The patient did not have any contraindication to HBOT. Given the risk of impending tissue loss, therapy was initiated immediately (ie, 4 days after the onset of symptoms). Treatment sessions consisted of 90 min session at 2.5 ATA oxygen with air-break every 30 min for 10 min (dualplace chamber, SIGMA II, Perry Baromedical Corporation, Riviera Beach, Florida, USA). The patient did not receive steroids or any other medication. She completed 14 sessions of hyperbaric treatment daily.

OUTCOME AND FOLLOW-UP

During the 14-day treatment period the patient had interval improvement of the skin lesions and near complete resolution of mucosal necrosis (figure 2). Figure 3 shows a photograph taken on the last day of the treatment. During the 14th HBOT session, the patient experienced a new onset left-sided otalgia. There was no subjective hearing loss. Otoscopic examination post HBOT revealed a Teed score of 1 barotrauma on the right ear and a Teed score of 3 on the left side.⁸ Middle ear barotrauma is the most common adverse effect of HBOT. Our process of obtaining informed consent prior to initiation of HBOT included discussion of the possibility of barotrauma. We decided to end the course of HBOT at this point given the good healing and the ear barotrauma. An otolaryngology consultation a few weeks later confirmed that both ears evolved favourably with no treatment. The patient had noticed hypoesthesia in the lateral aspect of the left upper lip as well as some very small, pitted scars along the left nasal groove. The former was not reported on presentation and partially improved during follow-up approximately 3 months after the treatment (figure 4).



Figure 2 Nine days after injection and on the fourth hyperbaric oxygen therapy session.

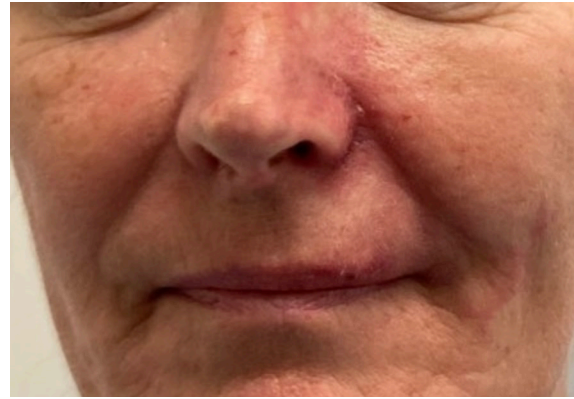


Figure 3 Nineteen days after presentation, during last (14th) hyperbaric oxygen therapy session.

DISCUSSION

The Undersea and Hyperbaric Society reviews and publishes approved indications for HBOT among which is the treatment of acute traumatic peripheral ischaemia.⁹ The rationale for using HBOT in ischaemic injuries is multifactorial including improved oxygen delivery to at risk tissues, decreased oedema, neovascularisation, decreased leucocyte adhesion, and anti-inflammatory and antimicrobial properties.⁹

Serious complications of cosmetic filler injections have been summarised elsewhere.^{2 3} While the treatment options are reviewed by many, little information is available about the details of the HBOT. Sun *et al* have reported the largest case series of 20 patients with ischaemic complications of hyaluronic acid injection. Their treatment regimen involved the use of hyaluronidase in addition to other adjuncts including HBOT. However, the precise HBOT protocol was not reported in this study.¹⁰ An important finding of their study was the significance of early detection and treatment (ie, defined as within 2 days) which was associated with improved outcome. The case we report here suggests that HBOT initiated after delayed patient presentation may still be worthwhile. However, since we report only a single case, it would be speculative to consider how complete or incomplete the healing might have been in the absence of HBOT in the patient we treated.

Zeltzer and colleagues have described a detailed account of a case of vascular occlusion after hyaluronic acid injection who presented after 4 days.¹¹ Hyaluronidase was promptly administered and HBOT was initiated 1 week later. Of note, an area of necrosis had already been established, and eschar formation was developing prior to initiation of HBOT. In our case, HBOT



Figure 4 During a follow-up visit, approximately 3 months after the conclusion of the treatment.

was initiated concurrently with administration of hyaluronidase and was continued until substantial improvement was achieved. Anecdotally, early use of HBOT is justified as it could decrease tissue oedema through vasoconstriction while improving oxygen delivery in the form of increased dissolved blood oxygen content. Furthermore, the anti-inflammatory and immunomodulatory properties could also be useful in minimising tissue injury after ischaemia reperfusion while promoting healing.¹²

Initiation of HBOT is often resource intensive and maybe logistically challenging. Therefore, it is important that cosmetic practitioners, family physicians and emergency physicians be familiar with the potential role that HBOT can play and to request such services as soon as it may be indicated. Given the lack of high-quality reporting guidelines specific to hyperbaric medicine, authors should describe the details of their hyperbaric therapy (eg, time of initiation, protocol, number of session, etc) in order to be able to learn from clinical experience.

Patient's perspective

I felt that it [the HBOT] was very effective. It worked very well. I was very happy with the results. I was very surprised. I did not expect that it would heal me that well. I have very minimal amount of scarring. There was no negative aspect to the treatment. I feel I was very lucky that everything lined up the way it did for me. I feel fortunate that I was able to get the proper care and the proper treatment. I feel like I could have had permanent scarring otherwise, on my face. It was increasingly getting worse. So without the treatment and without the hyperbaric unit allowing me to go immediately that day, I feel very blessed to be able to take part of that.

Learning points

- ▶ Serious complications from filler injection should ideally be diagnosed early.
- ▶ Hyperbaric oxygen therapy (HBOT) can be considered as a treatment modality for ischaemic complications related to cosmetic fillers, specifically for delayed patient presentation.
- ▶ Future research should further evaluate the ideal HBOT regimen (dose, frequency and duration) after vascular occlusion due to filler injection.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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