

Intralesional Laser Treatment for Dermal Filler Complications

Leonie W. Schelke, M.D.

Tom S. Decates, M.D.

Claudia I. M. van der Lugt,
M.D.

Levi Pelzer, M.Sc.

Gabrielle de Mey, MS4

Peter J. Velthuis, M.D., Ph.D.

Rotterdam, Meijel, and

's-Hertogenbosch, The Netherlands



Background: For complications caused by filler treatments, in general, two treatment regimens are advised: systemic drugs and surgical removal of the material. Another possible treatment option would be removal of the material by intralesional laser treatment.

Methods: Two hundred forty-two patients with complications caused by fillers were treated with intralesional laser treatment.

Results: In the majority of patients, an improvement was achieved (92 percent), in 9 percent the complication was resolved, and in 3 percent it was not improved (unknown in the rest).

Conclusion: Considering the large number of patients treated until now and the efficacy and good safety profile of this treatment, the authors plead that intralesional laser treatment may be considered as a treatment option before surgery. (*Plast. Reconstr. Surg.* 141: 1361, 2018.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

Although there is ongoing popularity of dermal filler use and an increasing number of treatments performed, much is unknown about complications with regard to their rate, possible causes, and optimal treatment options. As filler treatments are mainly performed as a cosmetic treatment in healthy clients, not only the treatment itself but also the options if any complications occur should be safe and must avoid severe side effects.

Looking at the literature, there is no consensus about the nature of these complications or treatment modalities.¹ One hypothesis of the cause of complications is a chronic foreign body response^{2,3}; another theory is biofilm formation around dermal fillers, probably consisting of skin bacteria.^{4,5} Both are thought to cause an inflammatory response.

In general, two treatment regimens are advised: systemic drugs^{1,6} and surgical removal of the material.^{2,7} Drugs can be useful to suppress the adverse reactions toward the filler material but they do not remove the filler itself. The drugs used are antibiotics, preferably from the macrolide group 1, as these will treat bacterial

inflammatory reactions and suppress foreign body responses by up-regulating the production of antiinflammatory mediators.^{8,9} The latter can also be treated with corticosteroids systemically or injected intralesionally. Surgical excision may remove (parts of) the material but often with tissue damage and scarring as a cosmetically undesirable result.

Another possible treatment option for filler complications has been developed and described by Cassuto et al.^{10,11} This treatment modality— intralesional laser treatment—is capable of removing the foreign substance in a microinvasive manner. In this article, we describe our treatment outcomes with intralesional laser treatment for dermal fillers.

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From the Dermatology Department, Erasmus Medisch Centrum; Alizonne Kliniek Molenbaan; and Lareb.

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PATIENTS AND METHODS

In the period between 2011 and 2016, 590 patients consulted our clinics for filler complications. Of these patients, 90 percent ($n = 531$) were women and 10 percent ($n = 59$) were men. Each patient's history was taken, especially complaints, onset of adverse event, medication, and earlier treatment regimens. All patients were evaluated with ultrasound examination. With ultrasound, information about the type of filler, the amount, the injection technique, the location and dislocation of the product, and the presence of an acute inflammatory reaction was gathered. Taking into account the degree of cosmetic disfiguration in a patient's face, the patient's complaints, and results from the ultrasound examination, patients were advised either to leave the filler at rest or to have the product evacuated (Fig. 1). All patients gave informed consent for the treatment performed. In 41 percent of the treatments, evacuation of the product was performed with the aid of intralesional laser treatment.

Intralesional Treatment

In our outpatient clinic, two types of lasers are used: a 810-nm-wavelength diode laser and a 1470-nm-wavelength diode laser (continuous wave) (Quanta System, Milan, Italy). Both lasers are developed and used for endovenous laser treatments. The 810-nm laser targets hemoglobin, and the 1470-nm laser heats water in blood and vein wall, secondarily destroying the vein wall.

In endovascular laser treatment of varicose veins, different wavelengths are used (810 and 1470 nm). Not the wavelength of the device but the amount of energy and heat delivered to the varicose veins is thought to be most important for achieving success.¹²⁻¹⁴ This will probably account for the intralesional treatment, and we found no

obvious difference in efficacy for these two different wavelengths.

The intralesional laser treatment procedure for dermal fillers consists of inserting a fiberoptic laser into the area of the product. The laser power setting for both lasers depends on the diameter of the fiber used and is on average 3 to 6 W for the 810-nm laser and 0.6 to 0.8 W for the 1470-nm laser, both in continuous-wave mode. Delicate areas such as orbital regions, glabella, and locations that have been treated with corticosteroid injections before were treated with reduced power to avoid skin burns. The fiber diameter may vary between 200 and 600 μm ; the smaller diameter is preferable. If the product is not clinically easily felt or seen, the fiber insertion can be performed under ultrasound guidance. Intradermal anesthesia at the skin entry point is commonly used in all instances. As the pain sensation of the patient is helpful to adjust the delivered energy into the filler, anesthesia is limited to the skin entrance. If too much heat is being delivered to the filler material or if the fiber is not in the right place, heat may be diffused into the surrounding tissues, risking tissue damage or pigmentation.¹¹ The patient is instructed to warn the operator if pain or excessive heat is sensed. During the intralesional laser treatment procedure, softening of the product is noticed, which is used as an endpoint. After the laser procedure, the heat-liquefied filler can be (partly) squeezed out by manual compression through an 18-gauge needle entry point or through a small incision made by a no. 11 scalpel (Fig. 2).

As we broadly follow the treatment regimen proposed by Cassuto et al., we have made some additions to their technique based on filler types: hydrophobic and hydrophilic fillers. They behave differently in tissue, but they have also been injected differently into the tissue.

Hydrophilic Fillers

Almost all nonresorbable hydrophilic fillers and resorbable hyaluronic acid fillers with large particles are used as volumizers and are often injected as a bolus. On ultrasound, they appear as hypoechoic pockets or cysts. Known filler types that give rise to complications in this category are polyalkylimide and polyalkylimide fillers and heavily cross-linked hyaluronic acids. Histologic examination indicates that these fillers tend to dehydrate over time. Dehydration may be one of the explanations why these types of fillers are difficult to remove. Before introducing the fiber into the filler, 1 to 10 ml (depending on the pocket

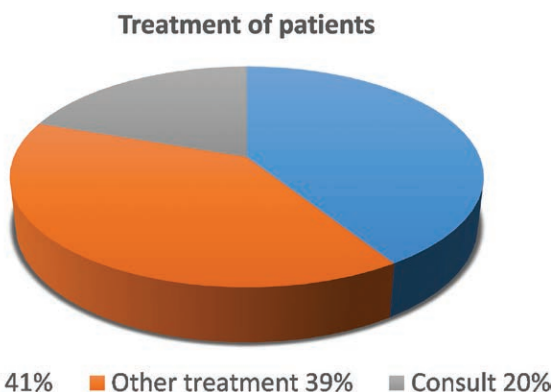


Fig. 1. Treatment of patients. *ILT*, intralesional laser treatment.

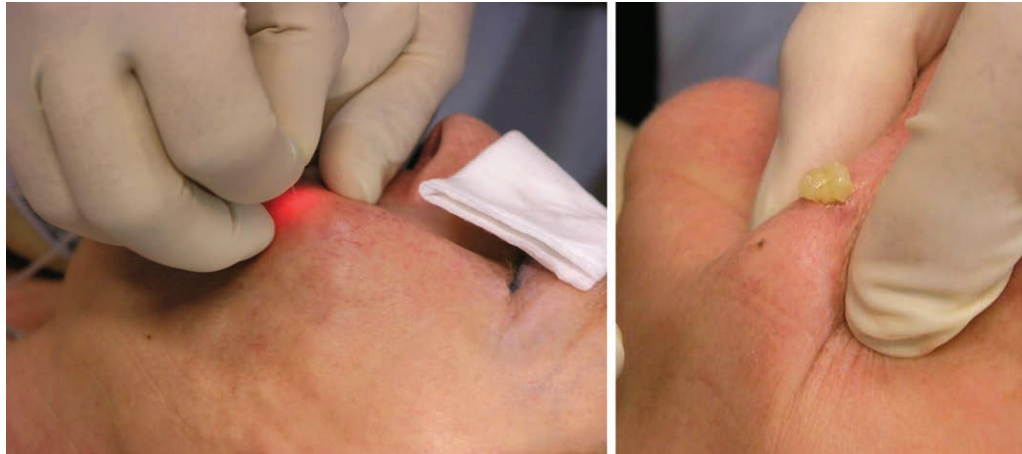


Fig. 2. (Left) The laser fiber is inserted in the filler. (Right) The heat-liquefied filler is squeezed out.

size) of 0.9% sodium chloride is injected into the filler depot, if needed under ultrasound guidance (Fig. 3). During heat delivery by the intralesional laser treatment fiber, the injected fluid is bubbling, also visible with ultrasound. [See Video, Supplemental Digital Content 1, which demonstrates the intralesional laser treatment procedure including corresponding ultrasound imaging. The intralesional laser treatment of a hydrophilic filler (polyalkylimide) is shown. As it is done under ultrasound guidance, the fiber tip can be inserted accurately in the filler pocket. When the clinical endpoint (softening of the product) is reached, the heat-liquefied filler can be squeezed out by manual compression, in this case through an 18-gauge needle entry point, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, available at <http://links.lww.com/PRS/C758>.] After the laser procedure, the pocket is irrigated again with

saline solution to mechanically flush out as much material as possible.

Hydrophobic Fillers

The most commonly used hydrophobic fillers are polymethylmethacrylate, hydroxyethylmethacrylate, and silicone oil (polydimethylsiloxane). The injection technique used is mainly infiltrating small particles into the tissue, leading to a fibrotic tissue response. The fiber is inserted into the area of the material, by drilling small holes. Little

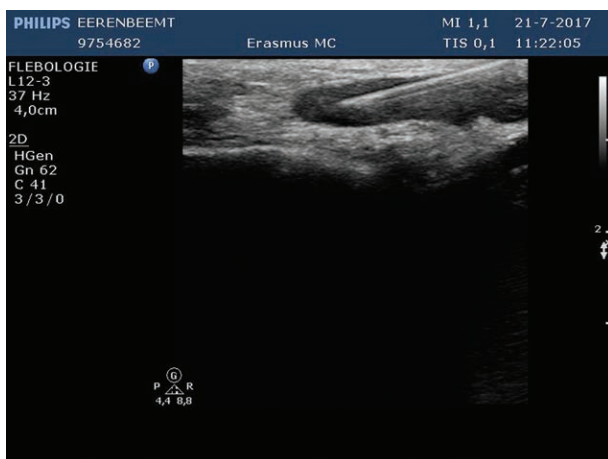


Fig. 3. Injection in filler depot under ultrasound guidance.



Video. Supplemental Digital Content 1 demonstrates the intralesional laser treatment procedure including corresponding ultrasound imaging. The intralesional laser treatment of a hydrophilic filler (polyalkylimide) is shown. As it is done under ultrasound guidance, the fiber tip can be inserted accurately in the filler pocket. When the clinical endpoint (softening of the product) is reached, the heat-liquefied filler can be squeezed out by manual compression, in this case through an 18-gauge needle entry point, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, available at <http://links.lww.com/PRS/C758>.



Fig. 4. Little droplets of silicone oil after intraslesional laser treatment.

droplets dripping out of the insertion openings show filler material (Fig. 4).

Posttreatment Recommendations

For hydrophobic fillers, heat compression followed by gentle massage to push out more product is advised for the first hours after treatment. For hydrophilic fillers, because the skin entrance is much larger (because of a stab incision with a no. 11 blade or an 18-gauge needle), it is advised to leave the skin at rest to prevent inflammatory

reactions. For all treatments, our postoperative advice is not to apply any cream or makeup until the entrance skin opening has healed, to prevent any secondary infection. Oral macrolide antibiotic treatment is given to patients at risk such as patients under corticosteroid treatment and immunocompromised patients (e.g., human immunodeficiency virus). Downtime is normally 2 to 4 days after treatment. A sensitive area such as the lips will give rise to a more pronounced swelling and could take 5 days to heal.

RESULTS

From January of 2011 to September of 2016, 590 patients visited our clinic. Of these 590 patients, 242 patients (214 women and 28 men) were treated with intraslesional laser treatment. The mean age of these patients was 52 years (range, 25 to 78 years). On average, 1.7 treatments were performed per patient (Fig. 5).

Most complications treated with intraslesional laser treatment were caused by polyalkylimide. Clinical symptoms to filler treatment complications were inflammatory reactions, visible lumps and nodules, dislocation and accumulation of the product, and hardening. In Figure 3, the complications treated with intraslesional laser treatment are listed per filler for the fillers used most often (Fig. 6).

FILLERS TREATED WITH ILT

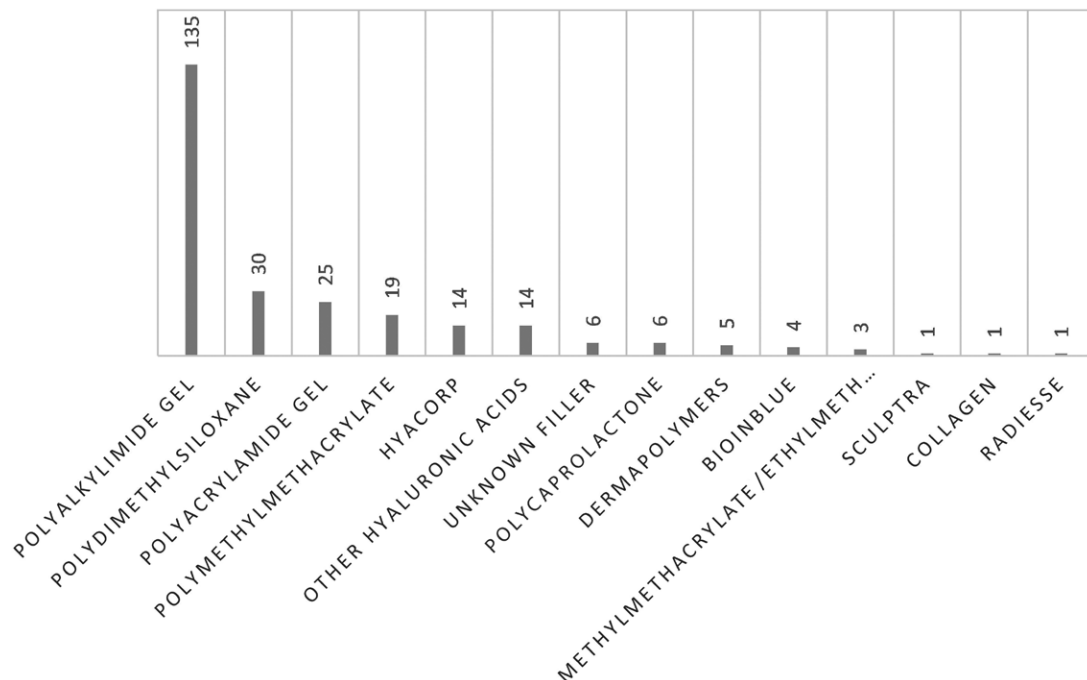


Fig. 5. Fillers treated with intraslesional laser treatment (ILT).

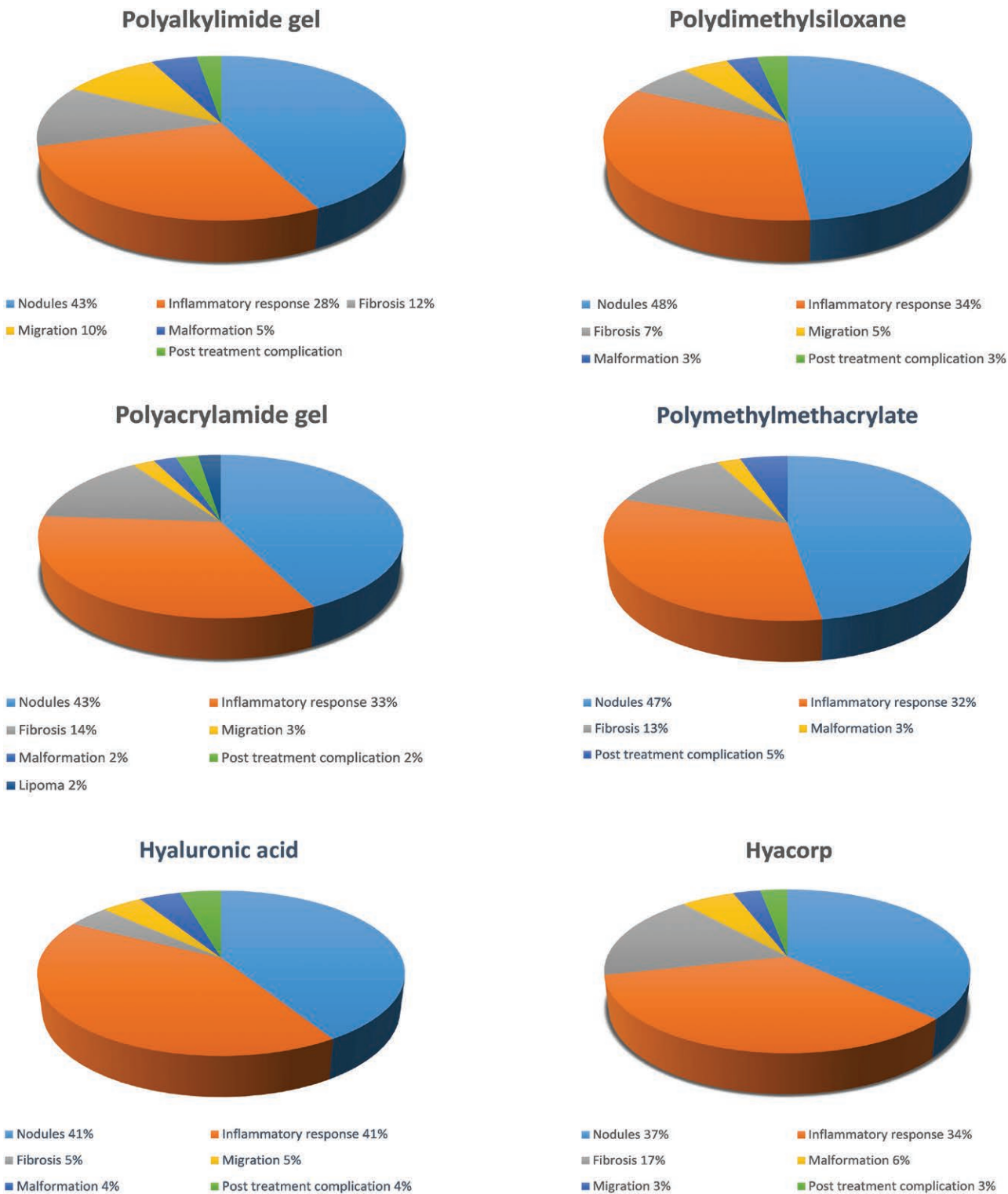


Fig. 6. Complications per filler for the six most common fillers.

It is interesting to note that 11 percent of the patients visiting our polyclinic had a complication caused by injections with resorbable hyaluronic acid fillers. Half of these complications are attributable to wrong injection techniques

resulting in dislocation of product caused by dynamics of the underlying muscles, excessive edema of the lower eye lid region, or inflammatory responses when volumes that are too large are injected (mostly hyaluronic acid products

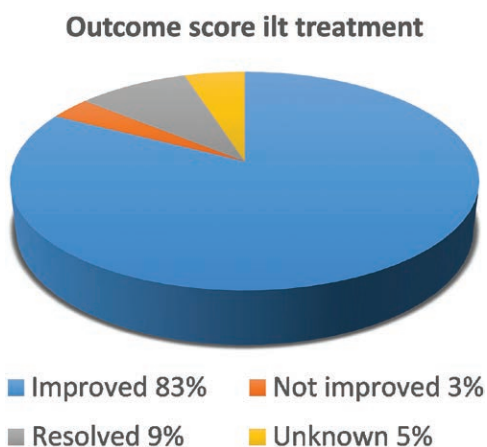


Fig. 7. Outcome score of intralesional laser treatment (*ilt*).

with a high viscosity and stiffness). The other 50 percent of the complications were attributable to cross-linking (up to 63 percent) of some hyaluronic acid products that were too strong, thus creating the same complications as seen with permanent fillers. In cases of volumes that are too large and products with excessive cross-linking, hyaluronidase alone was not successful in dissolving the filler, and intralesional laser treatment followed by hyaluronidase injection was necessary to remove it.

After treatment, patients were asked whether the treatment improved their cosmetic and physical complaints (Fig. 7). To stay in line with

the article by Cassuto et al., this was defined as follows:

Resolved: All symptoms are completely cured or judged tolerable by the patient.

Improved: Cosmetic disturbances and lump visibility are reduced to a degree judged tolerable by the patient. Interrupting the steroid therapy without recurrence is possible.

Not improved: no cosmetic and/or physical improvement (Fig. 8).

The improvement can also be seen with a follow-up ultrasound examination. Hydrophilic fillers decrease in pocket size or disappear, although fibrosis is mostly remaining (Fig. 9). The tight fibrotic tissue formed around hydrophobic fillers prevents ultrasound passage (shadowing). After intralesional laser treatment, the visibility of the tissue improves (e.g., teeth become visible again with follow-up ultrasound examination) (Fig. 10).

Patients not improved are mostly patients with an inflammatory reaction after intralesional laser treatment who visited a first aid department of a nearby hospital (not familiar with these types of problems) and, because of the drain placed as a treatment, without any follow-up or wound procedure management, were left with a scar in their face. Furthermore, fillers injected in the orbital region are more difficult to remove, leading to less satisfying results (Fig. 11).



Fig. 8. (Left) Before intralesional laser treatment. (Right) Improvement after intralesional laser treatment.



Fig. 9. (Above) Hydrophilic filler (black pocket on screen) before intralesional laser treatment. (Center) Hydrophilic filler is squeezed out after intralesional laser treatment. (Below) Decreased pocket size of hydrophilic filler on screen.

Complications Caused by Intralesional Laser Treatment

Inflammatory reactions as a complication caused by intralesional laser treatment are seen. As there is still no consensus about the cause of this reaction, a macrolide was given as treatment to cover any bacterial infection and an acute

inflammatory response as well. Ibuprofen was given for its pain-reducing and antiinflammatory characteristics. After a couple of days, the abscess could be evacuated by puncture. Normally, this will leave no visible scarring. Immunocompromised patients are more prone to develop post-intralesional laser treatment inflammatory responses.

One patient with large pockets of polyalkyl-imide injected in the lower orbital region (under the eyelids) was left with an open wound for months. Because of an excess of heat applied into this sensitive area, which had also been treated with cortisone injections previously, damage was done to the overlying skin. In combination with the large amount of filler remaining, there was a very slow healing response. If treating delicate areas such as the periorbital region (lower eyelid region), glabella, or skin treated previously with cortisone injections, the temperature should be adjusted lower.

One patient had persistent skin hyperpigmentation after the intralesional laser treatment. This can be prevented by making an insertion hole with a no. 11 scalpel and then inserting the fiber into the pocket of the filler, ensuring that no heat is applied to the skin surface. Placing the tip of the fiber on the skin and heating the fiber thereafter may cause a slight burning reaction that should be prevented in these cases and those with Fitzpatrick skin type III and higher.

DISCUSSION

There is still much to learn about complications caused by filler treatments. The relationship between product and the host response at the time of injection and during the degradation process is still not clear^{15,16}; thus, treatment options are difficult to standardize. However, in case of complications, it seems logical to at least remove as much filler product as possible.

In 2009, a small number of patients ($n = 20$) treated with intralesional laser treatment were described by Cassuto et al.¹⁰ In 2016, the same authors published an article regarding a large number of treated patients ($n = 219$) who experienced an improvement of their complaints.¹¹ We underscore these outcomes with our data.

Almost all patients noted an improvement after intralesional laser treatment, although not always as much as they hoped for. There may be remainders of the filler or of fibroses. Taking this into account, the minimally invasive manner of the treatment and the limited downtime add to the attractiveness of this method. Considering

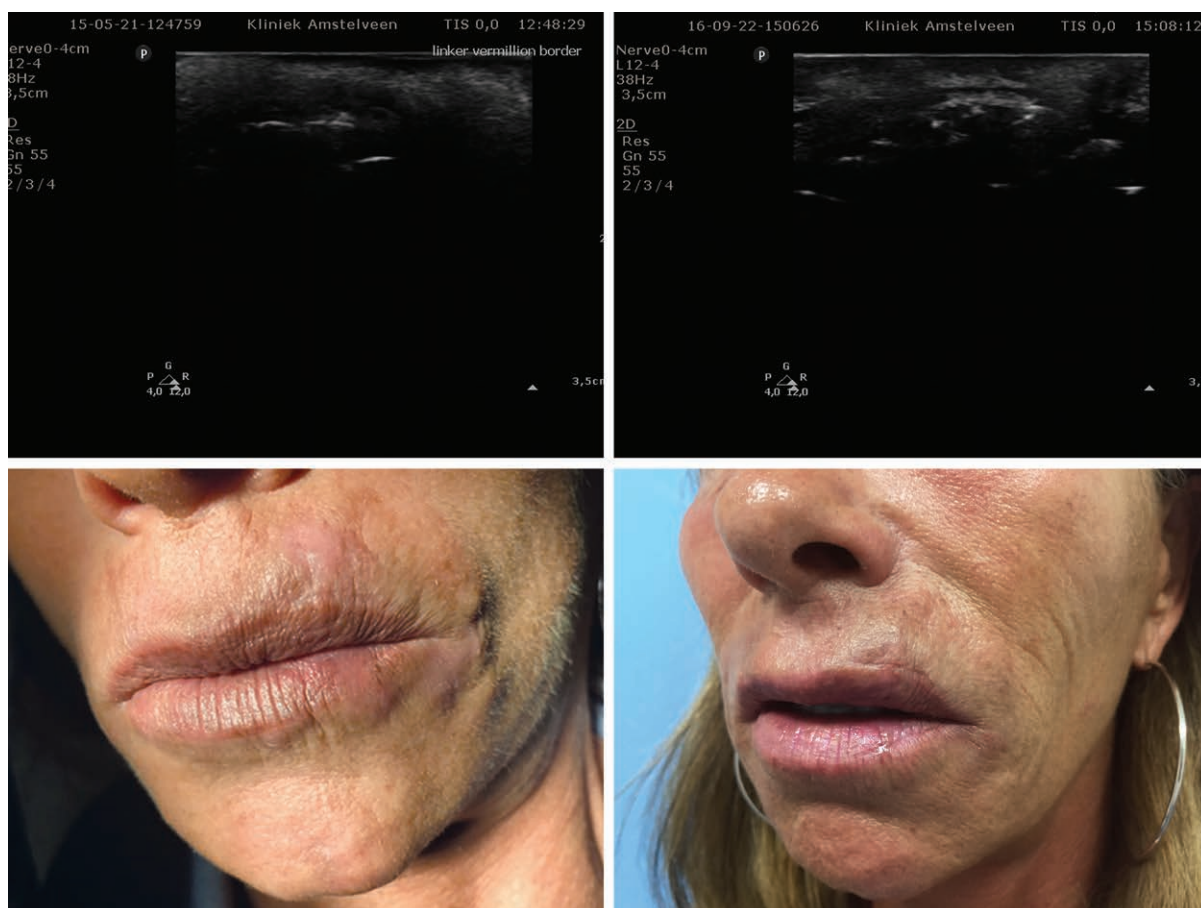


Fig. 10. (Above, left) Fibrotic tissue around silicone oil prevents most ultrasound wave passing through (shadowing). (Above, right) After intralesional laser treatment, more ultrasound waves can pass through. (Below, left) Before intralesional laser treatment of silicone oil. (Below, right) After intralesional laser treatment of silicone oil.



Fig. 11. (Left) Before intralesional laser treatment. (Right) After intralesional laser treatment, showing less improvement in the orbital region.

the large number of patients treated until now, and the efficacy and good safety profile of this treatment, we plead that intralesional laser treatment should be considered as a treatment option before surgery.

Leonie W. Schelke, M.D.

Department of Dermatology
Erasmus Medical Center
Postbus 2040
3000 CA Rotterdam, The Netherlands
lschelke@outlook.com

PATIENT CONSENT

Patients provided written consent for the use of their images.

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