

BLINDNESS FOLLOWING COSMETIC FILLER INJECTION IN THE FACE

The field of aesthetic medicine is gaining popularity around the world and this is also true for Malaysia. With the increasing demand for cosmetic facial injections, an increase in the complications associated with the procedure is inevitable. Generally, soft tissue filler injections are safe and effective in addressing facial ageing. Complications such as swelling, erythema or ecchymosis are mild and transient. Rare but severe vascular complications such as skin necrosis, stroke and blindness have been reported.²⁻⁵ The exact incidence of this devastating adverse event remains unknown due to the heterogeneity of data. As blindness following soft tissue filler injection may be a relatively new entity to the local ophthalmological scene, it is appropriate to highlight this issue.

Various soft tissue fillers are used in the face for aes-

thetic enhancement. These include autologous fat, hyaluronic acid gel (HAG), polymethylmethacrylate (PMMA), Poly-L-Lactic Acid (PLLA) and calcium hydroxyapatite, amongst others. The most common pre-prepared soft tissue filler used is hyaluronic acid gel (HAG) fillers. These HAG fillers are like the ophthalmic viscoelastic devices (OVD) used in ophthalmic surgery. One of the main differences is that the hyaluronic acid in cosmetic dermal fillers are crosslinked in a complex manner whereby it takes a longer time to be broken down by hyaluronidase enzymes in the body, lasting for about 9-18 months. It remains most doctors' favourite because of its availability, ease of use and has an antidote, hyaluronidase to melt the product for minor adjustment or reversal in case of severe complications such as vascular compromise.

“Autologous fat injections are associated with diffuse occlusions and poorer visual prognosis”

Table 1: Food and Drug Administration approved dermal fillers

Product	Type	Temporary/permanent	Reversible
Restylane, restylane silk	HAG	Temporary	Yes
Perlane	HAG	Temporary	Yes
Juvederm ultra, ultra plus, voluma	HAG	Temporary	Yes
Prevelle silk	HAG	Temporary	Yes
Belotero balance	HAG	Temporary	Yes
Radiesse	Calcium hydroxylapatite	Temporary	No
Sculptra aesthetic	Poly-L-lactic acid	Temporary	No
Artefill	PMMA	Permanent	No

HAG: Hyaluronic acid gel, PMMA: Polymethylmethacrylate

Table taken from Hwang CJ Periorbital Injectables: Understanding and Avoiding Complications J Cutan Aesthet Surg 2016 Apr-Jun; 9(2):73-79

The common sites of rejuvenation in the face are tear trough, nose, nasolabial folds, glabella, forehead, temples, chin and lips. Due to the complex vasculature of the face, essentially any location of the face may be at risk of ocular complications due to anastomoses between the branches of the external carotid artery (ECA) and internal carotid artery (ICA). The glabella (40%) and nose (26%) are considered high risk areas as their arteries have direct communication with the ophthalmic artery.³ It has been suggested that blindness is attributed

to intra-arterial injection and retrograde embolization of the filler material through an artery with a connection with the ophthalmic artery, as the injected bolus may overcome arterial pressure and move against the direction of blood flow. Once the plunger is released, the filler travels with the blood flow and enters the ophthalmic artery and its various branches. With higher injection pressures, filler particles may be pushed further retrograde and enter the brain circulation which can result in brain infarction.^{6,7,8}

Visual deterioration following filler injection can be the result of ophthalmic artery occlusion (OAO), generalized posterior ciliary artery occlusion (generalized PCAO) with relative sparing of the retina artery, central retinal artery occlusion (CRAO), localized PCAO, branch retinal artery occlusion (BRAO) and posterior ischaemic optic neuropathy (PION).⁹ Autologous fat injections are associated with diffuse occlusions, e.g. OAO and CRAO and characterized by severe clinical symptoms and poorer visual prognosis.⁷ It is responsible for 80.9% of cases of cosmetic filler-induced visual loss reported in the literature when compared to other fillers. HAG is the second most common which constitutes 39.1%. Autologous fat injections were much more likely to cause CNS complications in association with ocular adverse events, making up 82.6% of the cases compared with 8.7% from HAG injections.³

Common ocular symptoms are sudden painful or painless unilateral vision loss, ocular pain and headache which can occur during or immediately after injection. Nausea and vomiting secondary to increased intraocular pressure were reported. Visual loss may be accompanied by unilateral or bilateral ptosis, ophthalmoplegia, strabismus and/or ocular ischaemia.^{3,5,7,10,11} Other associated signs such as unilateral hemiparesis, hemiplegia, limb paresthesias, aphasia and dysarthria have been reported.³ The injection site may show oedema, erythema and pustules when cutaneous vascular supply is also compromised.

Full recovery of vision following filler embolism remains bleak although there are several papers that reported some visual recovery after various treatment modalities. Ptosis and ophthalmoplegia, on the other hand recovered in the majority of cases. This is likely because of nerve and muscle regeneration following vascular compromise, whereas retinal damage is irreversible after 90 mins.^{10,11} A recent case report by Szantyr et. al. reported the first full visual recovery noted after 120 mins from non-light perception following autologous fat injections into the forehead where ophthalmic treatments were initiated within 20 mins. In addition to the usual vascular occlusion treatment protocol, IV Aprostadi (Prostaglandin E1) and Vinpocetin (Vinka Alkaloid) were also given to further increase perfusion of the retina.¹²

Currently, there is no fully effective treatment described in the literature.³ The aim of treatment after soft tissue filler embolism is to attempt to dislodge the emboli from the retinal circulation. These are the same measures used in non-filler-associated CRAOs including lowering the intraocular pressure by ocular massage, anterior chamber paracentesis, IV acetazolamide and mannitol.¹¹ Other

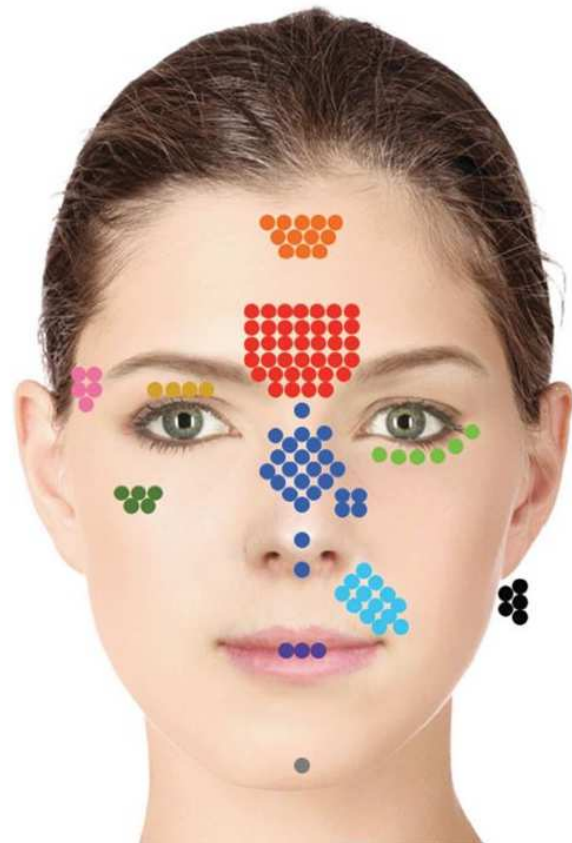


Figure 1. Location of injection for each case of blindness from filler. The 5 black dots represent cases in which the location was not specified and listed as "face."

Figure 1. Avoiding and treating blindness from fillers: A review of the world literature. Belezny K, Carruthers JD, Humphrey S, Jones D.

treatments including retinal vasodilatory agents, corticosteroids, thrombolysis, anticoagulants, hyperbaric oxygen and antibiotics have been reported.^{14,15} Retrobulbar hyaluronidase injection has been advocated by many as emergency treatment.^{3,16} However, an evaluation by Zhu et al failed to show any improvement in visual loss following 1500-3000 IU of hyaluronidase injected into the retrobulbar space in 4 patients.¹⁷ On the other hand, Chestnut recently reported full recovery of vision following three retrobulbar hyaluronidase injections and aspirin. A total of 750 IU were administered, 450 IU as retrobulbar injections and 300 IU around the supraorbital and infraorbital foramina.¹⁸

Intravitreal injection of hyaluronidase for other indications have been used safely in the past.¹⁹⁻²¹ However, no cases have been reported of its use in humans.

Box 2. Key Management Strategies

- (1) If a patient complains of ocular pain or vision changes, stop the injection at once. Immediately contact an ophthalmologist or oculoplastics colleague and urgently transfer the patient directly there.
- (2) Consider treating the injected area and surrounding location with hyaluronidase if HA filler is used.
- (3) Consider retrobulbar injection of 300 to 600 units (2–4 mL) of hyaluronidase if HA filler is used.⁴⁷
- (4) Reduction of intraocular pressure should be considered. Mechanisms to achieve this include ocular massage, anterior chamber paracentesis, IV mannitol, and acetazolamide.¹⁵
- (5) Given the relatively high prevalence of CNS complications that accompany blindness, it is important to monitor the patient’s neurologic status and consider ordering imaging studies of the brain if visual complications occur.¹⁹

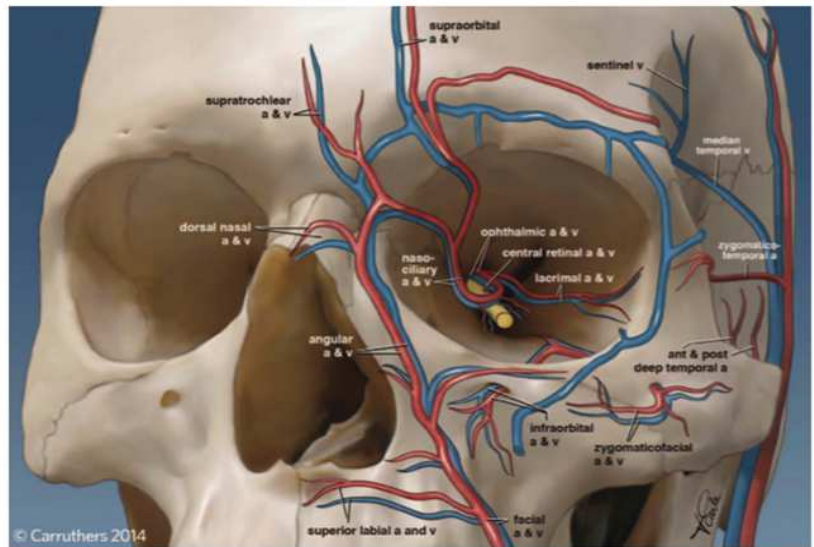


Figure 3. Vascular anatomy of the upper face (Copyright Jean D. Carruthers, MD, 2014).⁴⁷ a, artery; v, vein. Adaptations are themselves works protected by copyright. So in order to publish this adaptation, authorization must be obtained both from the owner of the copyright in the original work and from the owner of copyright in the translation or adaptation.

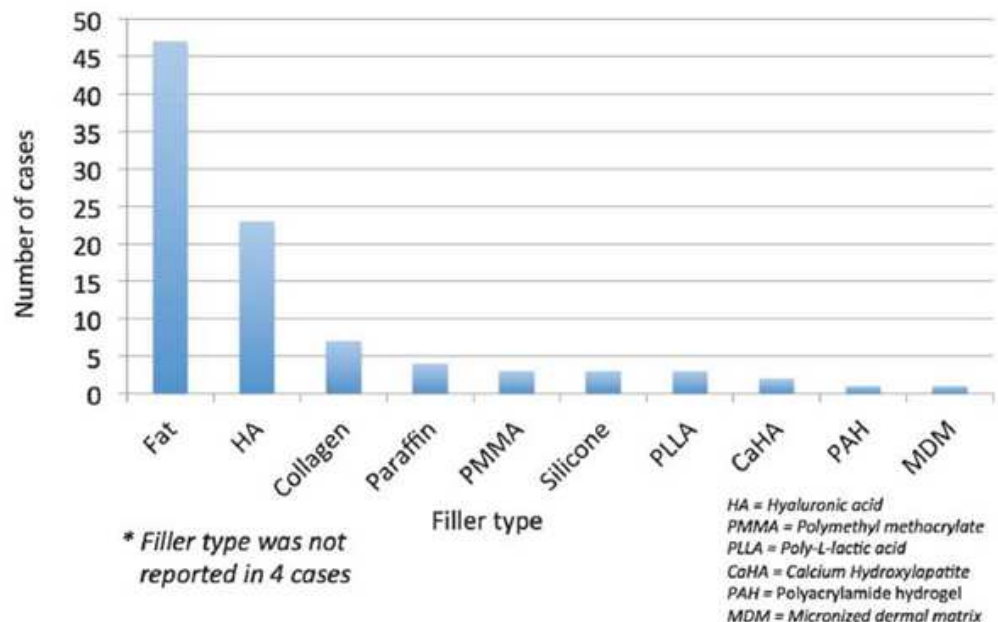


Figure 2. Number of cases of blindness from each filler type.

Figure 2. from Beleznav K, Carruthers JD, Humphrey S, Jones D. Avoiding and treating blindness from fillers: A review of the world literature

Direct intra-arterial injection of hyaluronidase into ophthalmic artery, via interventional neuroradiology, or cannulating the supraorbital or supratrochlear arteries have been proposed.^{22,23} There was success reported in cases of soft tissue ischaemia and could be a potential avenue of treatment.²⁴ Further investigations into the potential uses of hyaluronidase in vascular complications is needed and treatment may be a combination of all the above.

Ocular complications following dermal filler injection can arise even in the hands of the most skilled injectors. Education, recognition and early treatment are of paramount importance. In this emergency, time to initiating treatment by an appropriate eye specialist is key. It is advisable for all doctors practising cosmetic filler injections to identify and work with an eye specialist in their area to facilitate transfer and treatment.³

Presenting signs and symptoms	<ul style="list-style-type: none"> • Visual loss/blurring or dimming • Blanching and/or pain (especially pain that is felt away from the injection site)
Immediate action	<ul style="list-style-type: none"> • Lay the patient in the supine position • Lower intraocular pressure via topical timolol and/or acetazolamide • Intravenous mannitol • Ocular massage (repeated increased pressure was applied to the globe for 10–15 seconds, followed by a sudden release, for 3–5 minutes)
Definitive therapy (hyaluronic acid-specific)	<ul style="list-style-type: none"> • Consider aqueous paracentesis • Referral to retinal specialist centre or emergency department with trained staff and facilities within the window period of 60–90 minutes • Consider retrobulbar hyaluronidase administration
Supportive therapy	<ul style="list-style-type: none"> • Steroid administration • Antibiotics for suspected infection • Hyperbaric oxygen therapy where applicable • Heparinisation

Fig. 3 Treatment algorithm for addressing vision loss following filler injections.

Treatment algorithm recommendations from Loh DK, Chua JJ, Lee HM, Lim JT, Chuah G, Yim Benjamin, Puah BK. Prevention and Management of vision loss relating to facial fillers injections. Singapore Med J. 2016; 57(8):438-443

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