

Special Topic

Consensus Guidelines for the Management of Tissue Filler–Induced Vision Loss in the United Kingdom

Stafford Sansome, MBBS, BSc (Hons), FRCOphth; Mike Clague, BSc; Cormac Convery, MD; Emma Davies, RN, NMP; Catherine Fairris, BSc (Hons), MB, ChB, MRCP, MSc; Greg Goodman, MBBS, GRADDIPCLINEPI, FACD, MD[®]; Steven Harris, MBBCh, MSc; Elizabeth Hawkes, MBBS, BSc (Hons), FRCOphth; Gordon Hay, MD; Gillian Murray, MPharm, NMP; Sabrina Shah-Desai, MS, FRCS; Colin Vize, MBBS, FRCOphth, FHEA, PGCME; Lee Walker, BDS, MFDS, RCPSG, FDS, RCS (Eng); and James E. Neffendorf, MA (Cantab), MBBS (Lond), MD (Res), FRCOphth

Abstract

Worldwide, the use of soft tissue fillers for aesthetic purposes has significantly increased, as have the number of associated complications. Vision loss is a rare but catastrophic complication of injecting tissue fillers. We formed a UK multidisciplinary steering group in 2024 to develop consensus guidelines for the management of tissue filler–induced vision loss. The multidisciplinary steering group consisted of various specialists with significant expertise in aesthetics, emergency ophthalmology, oculoplastic surgery, and the retina. Consensus statements were formulated by the group. Recommendations focused on immediate emergency measures, access pathways to specialist care, improved consent processes, and increasing awareness of vision-related complications. These guidelines aim to provide pragmatic, evidence-based steps for frontline clinicians to optimize patient outcomes for this rare but devastating complication.

Level of Evidence: 5 (Risk)

There is rapidly increasing popularity of soft tissue fillers in aesthetic medicine and, in line with this, the number of complications has increased. Vision loss is a rare but catastrophic complication of injecting tissue fillers.¹⁻³ A literature review in 2015 identified 98 cases of vision compromise, which increased to 146 cases by 2018, and to 511 cases

by March 2023.^{2,4,5} Given this trend, along with challenges in the regulation and licensing of these procedures, it is likely that the number of patients developing tissue filler–induced vision loss will continue to increase. It is therefore important that there is greater awareness of this topic and the potential management strategies for its treatment within

Mr Sansome is an ophthalmology registrar (ST7) and Mr Hay is a consultant ophthalmologist in emergency medicine and ocular oncology, Moorfields Eye Hospital NHS Foundation Trust, London, UK. Mr Clague is an aesthetic nurse, Dermatology Institute of Victoria, Victoria, Australia. Dr Convery is a cosmetic doctor in private practice in Glasgow, UK. Ms Davies is an aesthetic nurse in private practice in Cardiff, UK. Dr Fairris is an aesthetic doctor in private practice in Winchester, UK. Dr Goodman is a professor of dermatology, Monash University, Melbourne, Australia. Dr Harris is an aesthetic doctor in private practice in London, UK. Dr Hawkes is a consultant ophthalmologist and oculoplastic surgeon in private practice in London, UK. Ms Murray is a clinical pharmacist, Institute of Pharmaceutical Science, King's College London, London, UK.

Dr Shah-Desai is a consultant ophthalmologist and board-certified cosmetic oculoplastic surgeon in private practice in London, UK. Dr Vize is a consultant ophthalmologist, Hull University Teaching Hospitals NHS Trust, Hull, UK. Dr Walker is an aesthetic dental surgeon in private practice in Liverpool, UK. Mr Neffendorf is a consultant ophthalmologist and vitreoretinal surgeon, King's College Hospital NHS Foundation Trust, London, UK.

Corresponding Author:

Mr James E. Neffendorf, King's College Hospital NHS Foundation Trust—Ophthalmology, Denmark Hill, London SE5 9RS, UK.
E-mail: james.neffendorf@nhs.net; Instagram: [@londoneyedoc](https://www.instagram.com/londoneyedoc)

Aesthetic Surgery Journal
2026, Vol 46(5) 563–568
Accepted date: December 22, 2025;
online publish-ahead-of-print January 5, 2026.
© The Author(s) 2026. Published by Oxford University Press on behalf of The Aesthetic Society.
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial reproduction and distribution of the work, in any medium, provided the original work is not altered or transformed in any way, and that the work is properly cited. For commercial re-use, please contact reprints@oup.com for reprints and translation rights for reprints. All other permissions can be obtained through our RightsLink service via the Permissions link on the article page on our site—for further information please contact journals.permissions@oup.com.
<https://doi.org/10.1093/asj/sjag002>
www.aestheticsurgeryjournal.com

OXFORD
UNIVERSITY PRESS

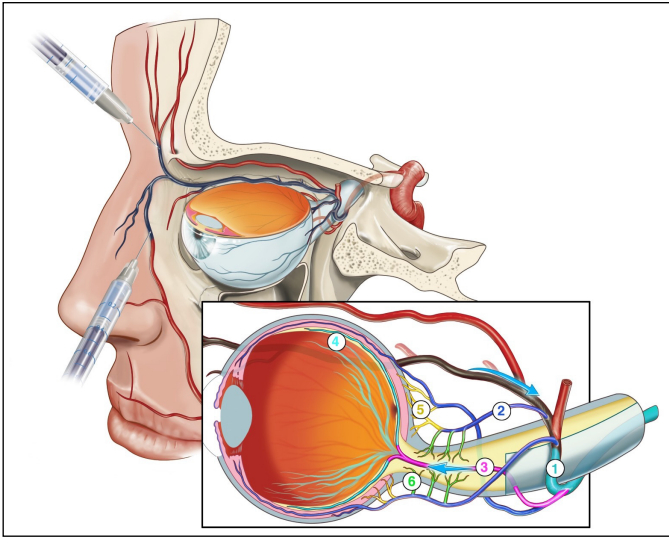


Figure 1. Illustration showing the potential connections of the arterial system between the site of injection and subsequent areas of occlusion. The high magnification inset illustration shows the potential points of arterial occlusion with color coding: (1) ophthalmic artery occlusion; (2) posterior ciliary artery occlusion; (3) central retinal artery occlusion; (4) branch retinal artery occlusion; (5) anterior ischemic optic neuropathy; (6) posterior ischemic optic neuropathy. Reproduced with the kind permission of Complications in Medical Aesthetic Collaborative (CMAC).

the aesthetic community. We formed a UK expert multidisciplinary steering group in March 2024 to develop consensus guidelines for the management of tissue filler–induced vision loss.

Inadvertent intravascular injection of percutaneous tissue filler (most commonly hyaluronic acid) into the facial arterial circulation can result in vision loss through retrograde embolization.^{6–8} The pattern of vision loss and other associated symptoms are determined by which artery is occluded, and this can be classified by 6 subtypes (Figure 1). Vision loss can be bilateral or unilateral, partial or complete, and most often occurs immediately or within 10 minutes of soft tissue filler injection. A literature review found that most cases (62.7%) had a presenting visual acuity of no perception of light.⁵ Ptosis and ophthalmoplegia have been reported in 56.2% and 44.1% of cases, respectively. Periocular skin changes also may be present, secondary to ischemia, necrosis, or acute cutaneous vascular insufficiency. Central nervous system (CNS) involvement, presenting with stroke-like features, is present in nearly 20% of cases. Visual recovery is variable, with the most important prognostic factor being the degree of vision loss at presentation (which is dependent on the location of the emboli).⁹

Various management strategies have been described in the literature. The most common treatment reported is subcutaneous injection of hyaluronidase administered at the filler injection site (70.1% of cases).⁵ Systemic steroids have been administered in 57.3% of cases, and intra-arterial thrombolytic therapy (IATT) in 56.0% of cases.⁵ Anatomically, IATT interventions are often successful in recanalization of occluded arteries, however only 34.2% of cases have vision improvement.⁵ There are also potentially more risks with IATT, which is an invasive and costly procedure requiring significant resources that are not often easily available.⁵ Retrobulbar hyaluronidase was administered in 12.6% of cases, however vision only improved in 5.3% of cases.^{5,10,11} Alternative routes of delivery for hyaluronidase have included peribulbar, supratrochlear, supraorbital, and subtenons injections, with very small numbers of each documented.⁵ Other interventions attempted include hyperbaric oxygen, anterior chamber paracentesis, ocular massage, aspirin and anticoagulants, intraocular pressure (IOP)–lowering drops, acetazolamide, mannitol, and glycerol trinitrate.⁵

Table 1. Posed to Multidisciplinary Steering Group

Questions
1. Should aesthetic clinicians performing tissue filler injections require development of a formal link with (or awareness of) their local ophthalmic unit so that there is no confusion of where to send a patient in the event of an emergency?
2. Should it be recommended that aesthetic clinicians performing tissue fillers have a vision loss/ischemic complications emergency kit (eg, timolol, hyaluronidase, etc) at their clinic?
3. Should the consent process for tissue fillers mandate mentioning the risk of vision loss and stroke?
4. What should be the initial management in the community in the event of filler-induced vision loss?
5. Should there be an estimated window of time (or maximum time) before an aesthetic clinician sets off to an ophthalmic emergency department?
6. Is there a role for hyaluronidase in the management of filler-induced vision loss? If so, what should be the mechanism of delivery?
7. Is there a role for anticoagulation in these patients?
8. What other drugs could be utilized?
9. What should the management of these patients be after arrival to hospital/specialist care?

At present, a multidisciplinary consensus on the management of tissue filler–induced vision loss is lacking in the United Kingdom, and the need for this is highlighted by the evolving case numbers and emerging reports in the literature. The aim of our multidisciplinary steering group was to help improve understanding of this complication, guide the initial management of suspected cases, and provide clinicians with a series of guidelines to maximize the chance of a better outcome for this rare but potentially devastating scenario.

METHODS

A multidisciplinary steering group was assembled with 12 members from the United Kingdom, coordinated by the Complications in Medical Aesthetics Collaborative, a charity focused on safety in aesthetic medicine. In addition, 2 clinicians were invited from Australia, due to their expertise following publication of their national guidelines.¹² The group consisted of 5 aesthetic doctors, 2 nurses, and 1 pharmacist with significant expertise in the field of aesthetics; 2 emergency ophthalmologists; 3 oculoplastic surgeons; and a retina specialist. The group met in March 2024 and May 2024. A number of questions were prepared by the lead author (J.N.) and then introduced to the group (Table 1). A wide-ranging evidence-based discussion was then conducted regarding each question. Options were then put to the group for a vote, allowing for a consensus statement to be developed when greater than 75% agreement was reached. Less than 75% agreement was deemed not to be a consensus. Following this, minor adjustments were permitted to the statements through discussion, before finalizing the consensus statement specific wording. The final consensus statements were then accepted unanimously by the group (Table 2).

RESULTS

The results of the discussions around the questions were as follows.

Table 2. Final Consensus Statements Reached by Multidisciplinary Steering Group

Key guidance statements
Aesthetic clinicians performing soft tissue filler injections should know their local emergency department (ED) location, and are highly recommended to have this printed out and accessible (name, address, etc). This is to reduce confusion and delay of transfer in the event of an emergency. We also would recommend that aesthetic clinicians consider telephoning the ED when en route to prepare for arrival, although this would need to be discussed by individuals with the relevant stakeholders at a local level.
Patients receiving tissue filler should be consented for the risk of vision loss and/or stroke, with the risk described as "rare."
In the event of a possible vascular occlusion following tissue filler with evidence or suspicion of ophthalmic or cerebrovascular involvement, patients should be taken to the closest ED, without delay, so that they can be formally assessed for these possibilities.
Best practice would be for the aesthetic clinician to accompany the patient to the ED and to bring with them hyaluronidase (at least 7500 IU). This would likely result in the patient, who is likely to be significantly distressed, arriving more quickly.
In the event of suspected filler-induced vision loss, the following interventions are recommended, although these interventions should not significantly delay transfer to ED. • Ocular massage • Topical timolol eye drops, 1 drop • 300-mg aspirin, single immediate dose (if no contraindication, eg, recent hemorrhagic stroke) • Rebreathing in a paper bag
There is some evidence that periocular hyaluronidase injection may be beneficial for the visual prognosis, and so it would be reasonable for the aesthetic clinician to attempt this if filler-induced vision loss is suspected, and if they are confident performing this procedure.
It is recommended that all aesthetic clinicians performing tissue filler injections attend a course on safety that includes best practice management in the event of a presumed vascular adverse event.

Question 1

Should aesthetic clinicians performing tissue filler injections require development of a formal link with (or awareness of) their local ophthalmic unit so that there is no confusion about where to send a patient in the event of an emergency?

There was recognition that there is wide regional variation in the provision of emergency ophthalmic care across the United Kingdom. This includes differences in pathways for accessing ophthalmic care which may be through a "walk-in" system or following primary review in an emergency department (ED). Furthermore, an ophthalmologist may not always be available on site, depending upon the hospital or time of presentation, making formal pathways difficult to establish. It was therefore agreed that attending the nearest ED reduces potential confusion and offers the greatest chance of timely review and treatment to provide the best visual outcome. All UK EDs have referral arrangements for patients presenting with ophthalmic disease. The group agreed that aesthetic clinicians should have the details of their local ED printed and accessible and that when possible they should accompany individuals to help handover and facilitate timely management.

It also was highlighted that the literature suggests approximately 20% of patients presenting with tissue filler-induced vision loss have CNS involvement.⁴ Treatment for CNS involvement would be the main priority in these cases, and presenting to a main ED was

therefore felt to be most appropriate, to ensure timely management by the medical or stroke team. Primary review or presentation to an emergency ophthalmic unit, which could potentially be a stand-alone unit, might result in delayed management of CNS involvement if it was present alongside vision loss.

Question 2

Should it be recommended that aesthetic clinicians performing tissue fillers have a vision loss/ischemic complications emergency kit (eg, timolol, hyaluronidase, etc) at their clinic? There was unanimous agreement that aesthetic clinicians who perform tissue filler injections should be recommended to have a vision loss/ischemia complications emergency kit readily available. The kit also might include easy-to-follow instructional guides, complete with flowcharts for recognizing symptoms and management plans. Any emergency kit contents should be regularly checked for expiration dates to ensure efficacy and safety. Aesthetic clinicians also should be encouraged to attend educational sessions focused on the identification and management of emergencies that require the emergency kit. Specific interventions recommended and the rationale for this are covered in Questions 4, 6, and 7, with that discussion forming the basis for the items listed below being included in the emergency kit:

- Timolol 0.5% eye drops
- Paper bag (for rebreathing)
- Aspirin 300 mg
- Hyaluronidase (at least 7500 IU), if trained in its use

Question 3

Should the consent process for tissue fillers mandate mentioning the risk of vision loss and stroke? It was unanimously agreed that the consent process for tissue filler should include the risk of vision loss. In addition, aesthetic clinicians should consent for hyaluronidase or other emergency measures they might employ in the event of complications. Although rare, all agreed that the risk of tissue filler-induced vision loss is potentially a life-changing event that the patient should be made aware of, in line with the Montgomery ruling.¹³ With regard to the reported incidence of filler-induced vision loss, a recent review reported a total of 511 cases, with overall incidence estimated at 0.001% (1 in 100,000 injections).^{5,14} It was accepted that there is difficulty in accurately quantifying the risk due to likely underreporting, underdiagnosis, uncertainty regarding the number of injections given, diagnostic variability, the absence of standardized data collection, and uncertainty about the risk correlation with the specific area injected. It was agreed that no specific figure for the risk should be quoted due to this uncertainty, and that the event should be quantified as "rare." Furthermore, aesthetic clinicians should consider including the risk of stroke during consent, because some series have shown that 24% of cases of filler-related blindness have coexisting stroke.²

Question 4

What should be the initial management in the community in the event of filler-induced vision loss? It was agreed that there are several initial non-invasive measures that can be utilized in filler-induced vision loss, with the aim of dislodging any embolus to promote its migration to a more peripheral portion of the ophthalmic vasculature that may permit retinal reperfusion. These measures work by lowering IOP to promote increased blood flow (eg, timolol drops), causing fluctuations in IOP (eg, ocular massage), or vasodilatation to increase blood flow (eg, rebreathing):

- Ocular massage, applying pressure over closed eyelid in 5-second cycles (10 seconds off) for up to 5 minutes with the patient supine at 15 to 45 degrees;
- Rebreathing into a paper bag for 10 minutes every 30 minutes;
- Timolol 0.5% drops, 1 drop to affected eye.¹⁵⁻¹⁷

We recognized that there was not high-level evidence (eg, randomized controlled trials) supporting techniques such as ocular massage in filler-related vascular occlusion. However, techniques such as ocular massage have been performed for many years in patients presenting with traditional cardiovascular embolic central retinal artery occlusions with minimal safety issues.¹⁵ In addition, given that multiple measures are often employed in these cases, discerning which may benefit the final visual outcome is extremely difficult to determine. Nonetheless, given the relative safety of these noninvasive measures (providing there are no preexisting contraindications), all of which can be easily performed by nonophthalmologists, it was agreed that they are worth attempting. However, the group did agree that these measures should not result in any significant time delay for transfer to the nearest ED. Periocular hyaluronidase is further discussed in Question 6. It was agreed that procedures such as anterior chamber paracentesis should not be routinely recommended, given that they pose the risk of further complications. Aesthetic clinicians should fully document all interventions that have been performed, and a template tick-box sheet would assist as an aide-mémoire.

Question 5

Should there be an estimated window of time (or maximum time) before an aesthetic clinician sets off to an emergency department? It was unanimously agreed that transfer to the nearest ED should take place without delay. With regard to specific time frames, there is a paucity of data on time from vision loss to presentation that would help determine outcomes. Although related to a different etiology, animal model studies have demonstrated that, in the setting of a traditional central retinal artery occlusion, reperfusion of the retina within 97 to 98 minutes can result in good recovery, and partial recovery has been shown with reperfusion up to 240 minutes, highlighting the urgency of review.^{18,19}

Further discussion took place around the need to perform testing such as measuring visual acuity and assessing pupil responses and ocular motility. It was agreed that the value of these tests is limited, given that they are unlikely to change management and may cause unnecessary delay in transfer to the nearest ED.

Question 6

Is there a role for hyaluronidase in the management of filler-induced vision loss? If so, what should be the mechanism of delivery? The use of hyaluronidase is an area of significant debate, and it was agreed that it should only be considered if vision loss was caused by a hyaluronic acid-containing filler. Hyaluronidase is an enzyme that breaks down the molecular bonds of hyaluronic acid in the tissue and is crucial to the natural turnover of hyaluronic acid. It is widely administered in medical practice to help injected fluids spread more easily through tissue, for example in subtenon ophthalmic anesthesia. A study of 35,850 cataract and refractive lens exchange procedures found it to be safe and effective.²⁰

In aesthetic medicine, the steering group acknowledged that it is unlicensed but recognized that it is widely employed for the management of tissue filler complications. Kroumpouzou and Treacy wrote a major review on the subject in 2024, stating that it was essential in

aesthetic practice because it can safely treat most hyaluronic acid filler complications, including vision loss.²¹ The authors acknowledged that there was a limitation in the number of randomized controlled trials. Indeed, they noted that its use was often based on the suggestions of leading authorities and assessment by expert panels. This echoes our approach and recommendations.

Second, the route of administration was carefully considered. Two consensus papers have recommended injections of hyaluronidase near the supraorbital notch or supratrochlear vessels if vision loss secondary to vascular occlusion is suspected.^{5,14} Other potential routes are subtenon, retrobulbar, or peribulbar. It was felt that most ophthalmologists are not adequately experienced to perform a retrobulbar or peribulbar injection, and that therefore this is likely true for aesthetic clinicians as well. Retrobulbar or peribulbar hyaluronidase in this setting was not supported, given limited evidence for its efficacy and the risks associated with these techniques (primarily ocular perforation).²²⁻²⁴

Overall, there is limited evidence to support intervention with hyaluronidase, although a small percentage (11.1%) of cases have shown recovery of vision in cases of tissue filler-induced vision loss in a systematic review.²⁵ It was agreed unanimously that the external use of periocular hyaluronidase in the area filler was injected or near the supraorbital notch or supratrochlear vessels could be attempted if the individual is competent in this technique and doing so would not significantly delay transfer. It also should be noted that hyaluronidase injection may not always be practical in the setting of a distressed patient in acute, severe pain, and that it should only be performed with the patient's consent and cooperation.

Question 7

Is there a role for anticoagulation in these patients? There is no direct evidence for the role of anticoagulation as an adjunct treatment in the setting of tissue filler-induced vision loss. There is a theoretical benefit, however, that aspirin may limit any platelet aggregation secondary to the embolic arterial occlusion. There was consensus that an immediate dose of 300 mg of oral aspirin can be given in this context as long as there are no contraindications, such as allergy or known recent hemorrhagic stroke.

Question 8

What other drugs could be employed? No additional drugs or medications were suggested by the group that had not been covered in Questions 4, 6, and 7.

Question 9

What should the management of these patients be after arrival to hospital/specialist care? There was consensus that ensuring timely assessment upon arrival to hospital is key to ongoing management. If assessment demonstrates cerebrovascular involvement, then urgent involvement of stroke services would be essential. Urgent involvement of ophthalmology upon arrival to hospital services also is recommended. Further interventions would be tailored to the patient's specific condition, assessment, and any initial management that has taken place in the community. Hyaluronidase should be considered as described in Question 6.

There were no further specific management strategies advocated in addition to those already covered in previous questions. Following discussion of the questions key guidance statements were agreed upon (Table 2).

DISCUSSION

Alongside the guidelines, education of aesthetic clinicians administering tissue fillers was discussed, because this is crucial for improving clinical practice. The group agreed that it should be recommended that all aesthetic clinicians performing tissue filler injections attend safety education courses. This would increase awareness of best practice, reducing the risk of complications and improving the management of any vascular adverse events that do occur. Techniques such as a hyaluronidase injection can be taught in education courses, with certification of competence awarded.

There was consensus that the available data on tissue filler-induced vision loss are limited, and therefore it is challenging to determine best practice, for example, regarding the benefit of and best route for administration of hyaluronidase. It is a limitation that these guidelines are based on published case series and expert opinion rather than controlled studies. In addition, some guidance, for example, regarding rebreathing, intraocular pressure-lowering drops, and ocular massage, is based on the practice of the management of vascular occlusion for traditional cholesterol emboli. There is no direct evidence that the techniques also work for filler-related occlusions, although it is conceivable, given that their proposed mechanism of action is to cause intraocular pressure variation and promote travel of the embolus downstream, which is independent of the embolus itself.

With the rare and emergent nature of this condition, a controlled trial with or without randomization would be a very difficult undertaking. For the same reason it also is challenging to determine the best order of intervention. Clinicians ideally will employ these guidelines as a basis to create their own management protocol, because experience with certain techniques, such as hyaluronidase periocular injection, may vary.

Another limitation is knowing the true incidence of vision loss following filler. There is highly likely underreporting and underdiagnosis of the complication, absence of standardized data collection, and uncertainty regarding the total number of tissue filler injections the patient has received. Furthermore, there is a lack of robust data regarding risk correlation with the specific area being injected. Many of these issues would be served by better reporting of complications.

A shift toward better complication reporting might include an online standardized anonymized data collection tool. Not only would this give a better approximation of the absolute risk of such complications, but it also would improve our understanding of treatment patterns and trends over time. The setup of a registry would be a challenging undertaking and most likely would be best conducted by one of the international organizations that specialize in aesthetic complication management, such as the International Society of Aesthetic Competence or the Complications in Medical Aesthetic Collaborative.

Another factor to consider is the variation in healthcare among countries. Country-specific guidance would need to take into account availability of emergency care and expert ophthalmic care. For example, recent guidance has been published by authors in the United States that recommends referral of patients to a retinal referral center.²⁶ Availability of rapid retinal specialist review is not widely available in most countries, including the United Kingdom, and explains the difference of our guidance. There are, however, similarities, such as the recommendation for interventions such as pressure-lowering eye drops, vasodilation by paper bag rebreathing, and hyaluronidase. We do appreciate that there is variability in the availability of some medications (eg, hyaluronidase) recommended in these guidelines, depending on geographic location. However, care was taken during the discussions to ensure

generalizability to an international audience as much as possible, which was assisted by the inclusion of 2 experts from Australia in the steering group.

CONCLUSIONS

Although evidence remains limited, these guidelines establish a practical framework for aesthetic clinicians across the United Kingdom and may serve as a model for other healthcare systems. The guidelines were created with consideration of practical feasibility and accessibility throughout, and the proposed interventions would be viewed as cost effective when faced with potential visual loss. As the evidence base grows alongside the potential benefits of intravascular intervention, the practice of managing tissue filler-induced vision loss will need to be reviewed.

Disclosures

Dr Clague is a former employee and consultant for Allergan (an Abbvie company, North Chicago, IL, USA) and has worked with Galderma (Zug, Switzerland), Croma Pharma (Leobendorf, Austria), Xitide (Wilmette, IL, USA), Cryomed (Nové Zámky, Slovakia), ALMA Lasers (Tel-Aviv, Israel), and Hugel Aesthetics (Newport Beach, CA, USA) as a paid speaker, trainer, and consultant. Dr Clague is also the co-owner of Facecoach Training Company (South Yarra, Victoria, Australia). Ms Davies is the chair of the Complications in Medical Aesthetic Collaborative (CMAC) and Clinical Director of Save Face (Los Angeles, CA, USA). Dr Goodman is an investigator and consultant with advisory board roles at Galderma, Allergan, L'Oreal (Clichy, France) and Inova (Falls Church, VA, USA). Dr Shah-Desai serves as a key opinion leader (KOL) for Teoxane (Geneva, Switzerland) and is a former KOL for Galderma. She also has received honoraria as a paid speaker, trainer, or advisory contributor from Acclaro (Boston, MA, USA), Sofwave (Yokne'am Illit, Israel), ExoCoBio (Seoul, South Korea), Lorient (Birmingham, MI, USA), Laboratoires Fillmed (Paris, France), Novoxel (Netanya, Israel), Revance Therapeutics (Nashville, TN, USA), and Clarion Medical Technologies (Cambridge, ON, Canada). Mr Neffendorf and Ms Murray are cofounders of Aesthetic Ocular Safety Ltd (Leeds, UK), a commercial entity that is involved in educational activity related to the topic of this manuscript. Mr Neffendorf has an advisory board role at DORC (a Zeiss Company; Oberkochen, Germany) and previously held an advisory role at Solvemed (Cambridge, Cambridgeshire, UK). Mr Neffendorf also has received conference support from DORC (a Zeiss Company), Moria (Massy, Île-de-France, France), and Samsara (San Francisco, CA, USA). The other authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Funding

The authors received no financial support for the research, authorship, and publication of this article.

REFERENCES

1. Park SW, Woo SJ, Park KH, et al. Iatrogenic retinal artery occlusion caused by cosmetic facial filler injections. *Am J Ophthalmol*. 2012;154:653-662.e1. doi: [10.1016/j.ajo.2012.04.019](https://doi.org/10.1016/j.ajo.2012.04.019)
2. Beleznay K, Carruthers JD, Humphrey S, et al. Avoiding and treating blindness from fillers: a review of the world literature. *Dermatol Surg*. 2015;41:1097-1117. doi: [10.1097/DSS.0000000000000486](https://doi.org/10.1097/DSS.0000000000000486)

3. Lazzeri D, Agostini T, Figus M, et al. Blindness following cosmetic injections of the face. *Plast Reconstr Surg*. 2012;129:995-1012. doi: [10.1097/PRS.0b013e3182442363](https://doi.org/10.1097/PRS.0b013e3182442363)
4. Beleznyay K, Carruthers JD, Humphrey S, et al. Update on avoiding and treating blindness from fillers: a recent review of the world literature. *Aesthet Surg J*. 2019;39:662-674. doi: [10.1093/asj/sjz053](https://doi.org/10.1093/asj/sjz053)
5. Doyon VC, Liu C, Fitzgerald R, et al. Update on blindness from filler: review of prognostic factors, management approaches, and a century of published cases. *Aesthet Surg J*. 2024;44:1091-1104. doi: [10.1093/asj/sjae091](https://doi.org/10.1093/asj/sjae091)
6. Silva MTT, Curi AL. Blindness and total ophthalmoplegia after aesthetic polymethylmethacrylate injection: case report. *Arq Neuropsiquiatr*. 2004;62:873-874. doi: [10.1590/S0004-282X2004000500025](https://doi.org/10.1590/S0004-282X2004000500025)
7. Sung MS, Kim HG, Woo KI, et al. Ocular ischemia and ischemic oculomotor nerve palsy after vascular embolization of injectable calcium hydroxylapatite filler. *Ophthalmic Plast Reconstr Surg*. 2010;26:289-291. doi: [10.1097/IOP.0b013e3181bd4341](https://doi.org/10.1097/IOP.0b013e3181bd4341)
8. Danesh-Meyer HV, Savino PJ, Sergott RC. Ocular and cerebral ischemia following facial injection of autologous fat. *Arch Ophthalmol*. 2001;119:777-778. doi: [10.1001/archophth.119.5.777](https://doi.org/10.1001/archophth.119.5.777)
9. Jones DH, Fitzgerald R, Cox SE, et al. Preventing and treating adverse events of injectable fillers: evidence-based recommendations from the American Society for Dermatologic Surgery Multidisciplinary Task Force. *Dermatol Surg*. 2021;47:214-226. doi: [10.1097/DSS.0000000000002921](https://doi.org/10.1097/DSS.0000000000002921)
10. Thanasarnaksorn W, Cotozana S, Rudolph C, et al. Severe vision loss caused by cosmetic filler augmentation: case series with review of cause and therapy. *J Cosmet Dermatol*. 2018;17:712-718. doi: [10.1111/jocd.12705](https://doi.org/10.1111/jocd.12705)
11. Chen H, Wang H, Yang Z. A case of hyaluronic acid induced blindness with ophthalmoplegia and ptosis. *Ophthalmic Plast Reconstr Surg*. 2018;34:e184-e186. doi: [10.1097/IOP.0000000000001234](https://doi.org/10.1097/IOP.0000000000001234)
12. The Royal Australian and New Zealand College of Ophthalmologists. *RANZCO Guideline for Filler Blindness*. The Royal Australian and New Zealand College of Ophthalmologists; 2024.
13. Beckett H, Radford J. 'Montgomery consent': decision of the UK supreme court. *Montgomery v Lanarkshire Health Board* [2015]. [2015] UKSC 11; [2015] WLR 768. *Pract Midwife*. 2016;19:27-29. <https://www.supremecourt.uk/cases/uksc-2013-0136>
14. Goodman GJ, Magnusson MR, Callan P, et al. A consensus on minimizing the risk of hyaluronic acid embolic visual loss and suggestions for immediate bedside management. *Aesthet Surg J*. 2020;40:1009-1021. doi: [10.1093/asj/sjz312](https://doi.org/10.1093/asj/sjz312)
15. Ffytche TJ. A rationalization of treatment of central retinal artery occlusion. *Trans Ophthalmol Soc*. 1974;94:468-479.
16. Sharma RA, Newman NJ, Biousse V. Conservative treatments for acute nonarteritic central retinal artery occlusion: do they work? *Taiwan J Ophthalmol*. 2021;11:16-24. doi: [10.4103/tjo.tjo_61_20](https://doi.org/10.4103/tjo.tjo_61_20)
17. Barbarino S, Banker T, Fezza J. Standardized approach to treatment of retinal artery occlusion after intraarterial injection of soft tissue fillers: EYE-CODE. *J Am Acad Dermatol*. 2022;86:1102-1108. doi: [10.1016/j.jaad.2020.12.047](https://doi.org/10.1016/j.jaad.2020.12.047)
18. Hayreh SS, Weingeist TA. Experimental occlusion of the central artery of the retina. IV: retinal tolerance time to acute ischaemia. *Br J Ophthalmol*. 1980;64:818-825. doi: [10.1136/bjo.64.11.818](https://doi.org/10.1136/bjo.64.11.818)
19. Chen C, Singh G, Madike R, et al. Central retinal artery occlusion: a stroke of the eye. *Eye*. 2024;38:2319-2326. doi: [10.1038/s41433-024-03029-w](https://doi.org/10.1038/s41433-024-03029-w)
20. Lerch D, Venter JA, James AM, et al. Outcomes and adverse events of sub-tenon's anesthesia with the use of a flexible cannula in 35,850 refractive lens exchange/cataract procedures. *Clin Ophthalmol*. 2020;14:307-315. doi: [10.2147/OPTH.S234807](https://doi.org/10.2147/OPTH.S234807)
21. Kroumpouzos G, Treacy P. Hyaluronidase for dermal filler complications: review of applications and dosage recommendations. *JMIR Dermatol*. 2024;7:e50403. doi: [10.2196/50403](https://doi.org/10.2196/50403)
22. Goodman GJ, Clague MD. A rethink on hyaluronidase injection, intraarterial injection, and blindness: is there another option for treatment of retinal artery embolism caused by intraarterial injection of hyaluronic acid? *Dermatol Surg*. 2016;42:547-549. doi: [10.1097/DSS.0000000000000670](https://doi.org/10.1097/DSS.0000000000000670)
23. Chesnut C. Restoration of visual loss with retrobulbar hyaluronidase injection after hyaluronic acid filler. *Dermatol Surg*. 2018;44:435-437. doi: [10.1097/DSS.0000000000001237](https://doi.org/10.1097/DSS.0000000000001237)
24. Wibowo A, Kapoor KM, Philipp-Dormston WG. Reversal of post-filler vision loss and skin ischaemia with high-dose pulsed hyaluronidase injections. *Aesthetic Plast Surg*. 2019;43:1337-1344. doi: [10.1007/s00266-019-01421-6](https://doi.org/10.1007/s00266-019-01421-6)
25. Sorensen EP, Council ML. Update in soft-tissue filler-associated blindness. *Dermatol Surg*. 2020;46:671-677. doi: [10.1097/DSS.0000000000002108](https://doi.org/10.1097/DSS.0000000000002108)
26. Barbarino S, Khalifian S, Fezza J. EYE-CODE protocol for the nonophthalmologist for treatment of retinal artery occlusion after intra-arterial injection of soft-tissue fillers: 2025 update. *J Cosmet Dermatol*. 2025;24:e70336. doi: [10.1111/jocd.70336](https://doi.org/10.1111/jocd.70336)