Deep Vein Thrombosis Following Descemet Stripping Automated Endothelial Keratoplasty

Venous thromboembolism is the second most common medical complication after surgery.1 The risk factors for development of deep vein thrombosis (DVT) include age, obesity, and diabetes mellitus.2 Deep vein thrombosis associated with ophthalmic surgery, specifically vitreoretinal surgery, has been reported.2

Descemet stripping automated endothelial keratoplasty (DSAEK) offers several advantages over conventional penetrating keratoplasty and has become the standard of care in managing endothelial dysfunction secondary to Fuchs endothelial dystrophy and pseudophakic bullous keratopathy. Descemet stripping automated endothelial keratoplasty involves the injection of an air bubble in the anterior chamber to assist in graft attachment, and patients typically maintain a position for 24 to 36 hours to facilitate graft attachment. Deep vein thrombosis has not been reported as a complication of DSAEK. Herein, we report the development of DVT in 2 patients following DSAEK.

Report of Cases | Case 1. A 76-year-old woman with a history of hypercholesterolemia and hypertension was diagnosed as having Fuchs endothelial dystrophy in both eyes and underwent DSAEK in the left eye with a retrobulbar block and an operative time of 45 minutes. The patient was in face-up position for 1 hour in the postoperative holding area prior to slitlamp examination. At slitlamp examination, the graft remained attached and centered. The air bubble in the anterior chamber cleared the inferior pupillary border. The patient went home and remained in face-up position for 24 hours. She noticed pain in her leg the second night and presented to the emergency department, where she was diagnosed as having DVT via ultrasonography.

Case 2. A 73-year-old obese woman had a history of transient ischemic attack and diabetes mellitus. At the time of surgery, she was taking metformin hydrochloride, simvastatin, extended-release dipyridamole, diclofenac, and aspirin. All the medications were continued following operation. The patient had a history of Fuchs endothelial dystrophy and aphakia and underwent iris-fixated intraocular lens implantation and DSAEK with an operative time of 75 minutes under topical anesthesia. The patient was in face-up position for 2 hours in the recovery room, and slitlamp examination showed an air bubble that cleared the inferior pupillary margin. On postoperative day 1, the graft was centered with a small peripheral detachment, and a 50% air bubble persisted. She remained in face-up position for 2 additional days, and the peripheral detachment resolved. Five days after surgery, the patient had shortness of breath and was found to have DVT and bilateral pulmonary embolism on evaluation in the emergency department.

Discussion | Immobilization reduces blood flow, leading to venous stasis that induces venous thromboembolism.2 Our patients were immobilized after surgery; our first patient remained in face-up position postoperatively for 1 day, while our second patient remained in face-up position for 3 days because of a peripheral detachment. More importantly, these patients had several risk factors to induce venous thromboembolism (Table). We speculate that preexisting risk factors along with an acquired risk factor, immobilization, in our patients led to development of DVT after DSAEK.

Fuchs endothelial dystrophy correlates with an increased rate of cardiovascular disease.3 Our patients with Fuchs endothelial dystrophy had cerebral vascular disease and hypertension. However, studies in the cell lineage indicate that the vascular and corneal endothelia are derived from mesodermal cells and the neural crest, respectively.4 Thus, additional studies are warranted.

Additional immobilization beyond the typical 24-hour period for management of a partial or full detachment also increases the risk of thromboembolic events. Thromboprophylaxis minimizes surgery-induced venous thromboembolism.1 Based on the American College of Chest Physicians guidelines,1 one may consider administration of anticoagulant agents such as low-molecular-weight heparin for the ophthalmic patients who have risk factors and are undergoing surgery. Mechanical methods of thromboprophylaxis such as intermittent pneumatic compression devices prevent DVT and may be used for patients at high clotting risk or as an adjunct to anticoagulant thromboprophylaxis.7 To prevent the occurrence of DVT in patients undergoing DSAEK who have risk factors for thromboembolic disease, combining the use of an anticoagulant and

<table>
<thead>
<tr>
<th>Sex/Age, y</th>
<th>Procedure</th>
<th>Operative Time, min</th>
<th>Postoperative Position</th>
<th>Outcome</th>
<th>Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/76</td>
<td>DSAEK</td>
<td>45</td>
<td>Face up for 1 d</td>
<td>DVT 2 d after surgery</td>
<td>Hypercholesterolemia, hypertension</td>
</tr>
<tr>
<td>F/73</td>
<td>DSAEK and iris-fixated IOL</td>
<td>75</td>
<td>Face up for 3 d</td>
<td>Bilateral PE derived from DVT 5 d after surgery</td>
<td>Diabetes mellitus, stroke, obesity</td>
</tr>
</tbody>
</table>

Abbreviations: DSAEK, Descemet stripping automated endothelial keratoplasty; DVT, deep vein thrombosis; IOL, intraocular lens; PE, pulmonary embolism.
an intermittent pneumatic compression device intraoperatively and postoperatively may be considered.²

Amy Zhang, MD
Majid Moshirfar, MD
Yousuf M. Khalifa, MD

Author Affiliations: Flaum Eye Institute, University of Rochester, Rochester, New York (Zhang, Khalifa); Moran Eye Center, University of Utah, Salt Lake City (Moshirfar).

Corresponding Author: Yousuf M. Khalifa, MD, Flaum Eye Institute, University of Rochester, 601 Elmwood Ave, Box 659, Rochester, NY 14642 (yousuf_khalifa@urmc.rochester.edu).

Author Contributions: Study concept and design: All authors.
Acquisition of data: Zhang, Khalifa.
Analysis and interpretation of data: All authors.
Drafting of the manuscript: All authors.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Zhang, Moshirfar.
Administrative, technical, or material support: Zhang, Moshirfar.
Study supervision: Moshirfar, Khalifa.

Conflict of Interest Disclosures: None reported.


Sudden Bilateral Vision Loss and Brain Infarction Following Cosmetic Hyaluronic Acid Injection

Periocular and paranasal injections of hyaluronic acid are increasingly common because it is purported to be a safe material for cosmetic implantation. Because of the multiple anastomoses between the vascular supply of the face and orbit, the potential for retrograde embolization of substances does exist.¹

To our knowledge, we report the first case involving sudden bilateral vision loss and brain infarction following an injection of hyaluronic acid.

Report of a Case | A 52-year-old woman received hyaluronic acid in the glabellar area as a cosmetic procedure for augmentation of the glabellar region by a local plastic surgeon. A few minutes after the injection, she suddenly had eye pain, headache, and vision loss. She was transferred to the emergency department of another medical center. The site of the initial injection was shown to have erythematous, violet reticular discoloration (Figure 1A). Fundus examinations showed the typical appearance of central retinal artery occlusion in the right eye and normal appearance of the left eye. Visual acuity was no light perception OD and 0.8 OS. Brain magnetic resonance imaging showed acute infarction in the right frontal, occipital, and parietal lobes (Figure 2A). Visual field examination disclosed a left hemianopia in the left eye (Figure 2B). The clinical features of the patient were consistent with brain infarction and central retinal artery occlusion in the right eye due to an injection of hyaluronic acid. The patient was treated with topical timolol maleate, oral acetazolamide (500 mg), and aspirin (100 mg) daily. The skin lesion at the site of the initial injection began to fade during the ensuing 7 days, and the patient was then discharged. She visited our clinic 1 month later. She remained blind in her right eye and a left hemianopia was noted in the visual field examination of the left eye. Funduscopic examination showed a pale optic disc as well as marked retinal ischemia and multiple emboli in retinal arterioles (Figure 1B).

Discussion | Hyaluronic acid gel is purported to be a very safe material for cosmetic implantation. It has been available worldwide and is popular among clinicians in cosmetic surgery procedures as a filler material. Hyaluronic acid was shown to cause local skin necrosis in 1 case.² A case of retinal branch artery occlusion³ and another case of central retinal artery occlusion combined with long posterior ciliary artery occlusion⁴ following the use of hyaluronic acid gel at glabellar areas have also been reported. For augmentation of the glabellar region, the material is injected intradermally using a 27- to 30-gauge needle with the opening of the needle facing upward.⁵ The dorsal nasal artery, which supplies the glabellar region, is a peripheral branch of the ophthalmic artery. It is possible that the mate-

Figure 1. Injection Site and Fundus Photograph

\[\text{A. The site of initial injection showed erythematous, violet reticular discoloration during the ensuing days. B. Pale optic disc and retinal whitening associated with the blood column are interrupted because of intra-arterial plugs after hyaluronic acid injection.}\]