scarring).\textsuperscript{1,3,4} Approximately 80% of indications for keratoplasty can be covered by selective replacement.\textsuperscript{5} The increasing demand and declining amount of available donor tissue led surgeons to the idea of splitting donor tissue for 2 recipients. The most common strategy is combining DALK with DMEK.\textsuperscript{2-5} The first studies on split-cornea transplantation documented promising results with saving rates up to 47% of donor buttons.\textsuperscript{3} The purpose of our study is to retrospectively evaluate the practicability of split-cornea transplantation in clinical routine.

Methods | Between July 1, 2011, and December 31, 2014, 1141 donor corneas were transplanted at the Department of Ophthalmology, University of Cologne, Cologne, Germany. Lamellar corneal grafts were performed preferentially. Penetrating keratoplasty was applied only if full-thickness replacement of the cornea was required (eg, in scarring, ulcerations, surgical macroporation during DALK).

In split-cornea transplantation, the anterior part of the donor button was used for DALK in one patient and the posterior part was used for DMEK in another patient. Depending on the availability of the patients, either DALK or DMEK was performed first. Remaining donor lenticules were grafted within 1 week. They were stored in culture medium (Biochrom) containing penicillin/streptomycin, amphotericin B, and fetal calf serum at 31°C ± 1°C. Microbiological tests were performed before and after surgery. Main outcome measures included the technique of surgical intervention (intended and performed) as well as the split use of donor tissue.

This retrospective, nonrandomized, clinical study conformed with the tenets of the Declaration of Helsinki. Written informed consent was obtained from all patients before surgery. The study was approved prospectively by the University of Cologne Institutional Review Board.

Results | A total of 1141 donor corneas were used for 1237 transplantations (714 DMEKs, 316 PKs, 100 DALKs, 74 Descemet stripping automated endothelial keratoplasties, and 33 others [7 Boston keratoprostheses and 26 tectonic corneoscleral patches]) in 951 patients (475 women, 476 men; mean [SD] age, 64.3 [17.4] years). Both DALK and DMEK were combined in 72 cases (75.0%), DMEK and tectonic corneoscleral patches were combined in 13 cases (13.5%), mini-PK (eccentric PKs, diameter ≤ 5 mm) and small DMEKs were combined in 5 cases (5.2%). Descemet stripping automated endothelial keratoplasty and tectonic corneoscleral patches were combined in 5 cases (5.2%), and Boston keratoprosthesis was combined with DMEK in 1 case (1.1%). Split-cornea transplantation was intended but not possible in 5 cases owing to conversion of DALK to PK (2 cases) or unexpected intraoperative events during DMEK surgery (3 cases), including complicated unfolding of the donor membrane. A total of 15.1% of corneal grafts could be performed as split-cornea transplantation, and a total of 96 donor buttons (7.8% [95% CI, 6.2%-9.4%]) could be saved.

Discussion | Our data show that indications and referrals for DMEK exceed those for DALK by far (714 vs 100, respectively). Only 15.1% of corneal grafts could be performed as split-cornea transplantation, resulting in 96 donor corneas being saved (7.8%). This asymmetric distribution suggests the need for scheduling DMEK and DALK recipients. Novel techniques with the potential to increase the availability of donor tissue, eg, using hemi-DMEKs (splitting 1 endothelial graft into 2 half-moon-shaped grafts),\textsuperscript{3,6} should be considered.

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Author Contributions: Dr Schaub had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Drafting of the manuscript: Schaub, Heindl. Critical revision of the manuscript for important intellectual content: Cursiefen, Heindl. Statistical analysis: Schaub, Heindl. Obtained funding: Cursiefen, Heindl. Administrative, technical, or material support: Cursiefen, Heindl. Study supervision: Cursiefen.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

Funding/Support: This work was supported by grant Forschergruppe 2240 from the German Research Foundation and by grant Biomedicine 1302 from European Cooperation in Science and Technology.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.


Sequential Optical Coherence Tomographic Angiography for Diagnosis and Treatment of Choroidal Neovascularization in Multifocal Choroiditis

Accurate diagnosis of choroidal neovascularization (CNV) is critical to ensure timely anti–vascular endothelial growth factor therapy and preclude loss of visual acuity. Dye-based angiography is the gold standard for CNV diagnosis; however, it is in-

Letters

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vasive, is associated with risk of allergy, and may be limited by availability. Optical coherence tomography (OCT) angiography (OCTA) is a noninvasive, non–dye-based modality that generates en face images (OCT angiograms) of retinal and choroidal vascular layers. This is one of the first reports, to our knowledge, describing the clinical utility of OCTA to diagnose CNV in multifocal choroiditis where dye-based angiography was equivocal, then using sequential OCTA imaging to evaluate response to anti–vascular endothelial growth factor therapy.

Report of a Case | A woman in her early 40s presented with acute vision loss in her left eye of 2 days’ duration. Her medical and travel histories were noncontributory. She was a glaucoma suspect based on optic nerve appearance. Best-corrected visual acuity was 20/20 OD and 20/40 OS. The right eye was normal with the exception of mild peripapillary atrophy and a cup-disc ratio of 0.7. In the left eye, there was mild 1+ cellular reaction in the anterior chamber and vitreous. There was a mildly elevated, hypopigmented deep chorioretinal lesion in the left fovea (Figure 1A) without associated fluid, hemorrhage, or exudate and scattered, small punctate and linear yellow deep choroidal lesions peripherally. Fluorescein angiography demonstrated early hyperfluorescence and late staining of the chorioretinal spots and staining of peripheral retinal veins (Figure 1B-D). Indocyanine green angiography revealed peripheral hypofluorescent spots and a pinpoint dot of late hyperfluorescence in the fovea (Figure 1E and F). Conventional spectral-domain OCT (Cirrus; Carl Zeiss Meditec) demonstrated an elevated foveal lesion beneath the retinal pigment epithelium with thickening and loss of distinct margins of the overlying ellipsoid and interdigitation bands but no fluid (Figure 2A). Multifocal choroiditis was diagnosed based on clinical and angiographic findings. Systemic testing results including the Venereal Disease Research Laboratory test, lysozyme, angiotensin-converting enzyme, purified protein derivative, and chest radiography were normal.

The foveal lesion was clinically suspect for CNV; however, this was not conclusive after dye-based angiography and spectral-domain OCT. Retinal vascular imaging with the prototype AngioVue OCTA software on the commercially available Avanti spectral-domain OCT device (Optovue) was performed. The 3 × 3-mm OCT angiogram demonstrated a lacy network of vessels in the outer retina scan, confirming the presence of CNV as this location is devoid of vessels in healthy eyes (Figure 2B). One week after treatment with intravitreal bevacizumab (1.25 mg/0.05 mL), OCTA revealed reduction in size and density of the CNV complex (Figure 2E and F). Sequential OCTA following the first (Figure 2G and H) and second (Figure 2I and J) treatments with bevacizumab revealed progressive, near-complete resolution of flow through the CNV. The lesion appeared inactive clinically without leakage on fluorescein angiography after the second treatment with bevacizumab.
Diagnosis of CNV may be challenging if typical features are not apparent and angiographic signs are equivocal. This may be more likely in eyes with early CNV or secondary to causes other than age-related maculopathy such as myopia or multifocal choroiditis. The use of OCTA enables noncontact imaging of retinal and choroidal vasculature based on motion contrast via mapping erythrocyte movement over time by comparing sequential OCT B-scans in a given cross section. The OCT angiogram and corresponding OCT B-scans are coregistered to enable simultaneous imaging of blood flow with structural features. While conventional fluorescein angiography provides dynamic retinal blood flow images, OCTA delivers static information by delineating the vasculature features, including size of the abnormal vasculature. This case highlights the potential utility of OCTA to characterize CNV size and pattern and to demonstrate reduction of size and density of flow through CNV after anti-vascular endothelial growth factor treatment.

Figure 2. Optical Coherence Tomography (OCT) and Sequential OCT Angiography (OCTA) of Choroidal Neovascularization

A-C, Cirrus OCT (A) and en face OCTA (B) revealed choroidal neovascularization, with subretinal fluid (arrowhead) present on Optovue B-scan (C). D-F, One week following the first treatment with bevacizumab, choroidal neovascularization was resolving on Cirrus OCT (D) and OCTA (E and F), with trace fluid (arrowhead in F). G and H, Four weeks following the first treatment with bevacizumab, OCTA showed decreased size and vascularity in choroidal neovascularization (arrowhead in G). I and J, Four weeks following the second treatment with bevacizumab, choroidal neovascularization (arrowhead in I) was barely visible on OCTA. C, F, H, and J, En face OCTA segmentation of the outer retina images is shown between the outer aspect of the inner nuclear layer (green line) and Bruch’s membrane (red line).

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Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Baumal reported serving as a consultant for Allergan and receiving a travel grant from Optovue. Dr Waheed reported serving as a consultant for Iconic Therapeutics; serving on the speakers bureau for Thrombogenics; and receiving research support from Carl Zeiss Meditec. Dr Duker reported serving as a consultant for and receiving research support from Carl Zeiss Meditec and Optovue. No other disclosures were reported.

Funding/Support: This work was supported in part by an unrestricted grant to the New England Eye Center, Tufts University School of Medicine from Research to Prevent Blindness and by the Massachusetts Lions Club.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of
the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

**Previous Presentation:** This article was presented in part at the Atlantic Coast Retina Club 2015 Meeting; January 9, 2015; Boston, Massachusetts.


**OBSERVATION**

**Facial Ulcers and Restrictive Strabismus From Delayed Periorbital Granuloma**

**After Poly-L–Lactic Acid Injection**

Complications of injectable fillers are uncommon but potentially devastating. Most adverse events occur soon after injection and are mild, including redness, itching, blanching, and nodule formation. More severe outcomes include soft-tissue necrosis, blindness, and anaphylaxis. Recently, numerous patients with histories of filler injection have developed delayed-onset granulomatous reactions and systemic inflammatory markers, a syndrome called autoimmune/inflammatory syndrome induced by adjuvants. Herein, we describe a patient with a nonhealing periorbital ulcer that progressed to orbital fibrosis. This presented a diagnostic dilemma owing to concurrent systemic inflammatory symptoms and a lack of reported history of facial fillers.

**Report of a Case |** A 49-year-old woman presented to the oculoplastics clinic with healed ulcers of the lower lip and nasal dorsum and a nonhealing ulcer of the left lateral infraorbital area. She reported several years of facial ulcers described as “scratches” developing over weeks to months into red, indurated, tender ulcers that finally crusted and healed. Prior to presenting to our clinic, she had undergone a punch biopsy of the lip lesion and debridement of the nasal ulcer in separate procedures at outside institutions.

The pathology department found granulomatous inflammation of unclear etiology. Our evaluation included consultations with the dermatology, otolaryngology, rheumatology, infectious diseases, gastroenterology, and psychiatry departments during which numerous diagnoses were considered, including scleroderma, granulomatosis with polyangiitis, polyomysitis-scleromyositis overlap syndrome, leprosy, and factitious disease. Our patient denied any history of facial surgery or exposures to foreign material or fillers. The patient’s review of systems was positive for dry mouth, Raynaud phenomenon, morning joint pain, mild hand and ankle swelling, and dysphagia. Maxillofacial computed tomography identified a nasal septal perforation, saddle nose deformity, clear paranasal sinuses, and the left infraorbital soft-tissue defect. Laboratory study results included positive findings for antinuclear antibodies (titer, 1:360; nuclear and cytoplasmic staining), mildly elevated angiotensin-converting enzyme level (78 U/L [to convert to nanokatals per liter, multiply by 16.667]), and mildly decreased C4 complement level. All other laboratory results were normal, including anti–proteinase 3, antinuclear factor, anti–Scl-70, human immunodeficiency virus, antiphospholipid, C3 complement, anticitrullinated protein, human leukocyte antigen B27, T-SPOT.TB test for tuberculosis, syphilis, erythrocyte sedimentation rate, and C-reactive protein. Biopsies of the ulcer base showed foreign-body granulomas and scant polarizable material of uncertain diagnostic significance. Cultures were negative for infectious causes, including leishmaniasis and acid-fast bacteria. The patient began treatment with oral prednisone and methylprednisolone to control inflammation.

Several months later, the patient developed diplopia, a sense of fullness below the left eye, and extrusion of white fibrous material from the ulcer base. Repeated examination found restriction of the left eye into a hypotropic and exotropic position and a full-thickness defect through the lateral lower eyelid, exposing conjunctiva and bony orbital rim (Figure 1). Magnetic reso-

Figure 1. Clinical Appearance of the Patient

A. The saddle nose deformity (black arrowhead) and infraorbital ulcer (white arrowhead) seen at onset of the diplopia. B. Several months later after the diplopia had stabilized and with the patient’s daily dressings in place.