**8/02/2025**

**Retinal Vascular Disease Symposium 1**

**Timing of Ocular Adverse Events in Pooled Analysis of Two Phase 3 Trials of Revakinagene Taroretcel (NT-501) in Macular Telangiectasia Type 2**


- Dean Eliott, MD
- Sophie Bakri, MD



**Objective:** To evaluate the incidence and timing of ocular treatment-emergent adverse events (TEAEs) across two identically designed, 24-month, phase 3 trials of the ciliary neurotrophic factor (CNTF)–producing encapsulated cell therapy, revakinagene taroretcel (NT-501), for macular telangiectasia type 2 (MacTel).
**Purpose:** MacTel is a progressive, bilateral neurodegenerative disease resulting in the loss of photoreceptors and vision. Currently, no treatment is FDA-approved for MacTel. The neuroprotective effect of CNTF has been confirmed based on several animal models of retinal degeneration. Since CNTF has a short half-life when administered intravenously, NT-501 was developed to deliver CNTF continually via an implant containing allogeneic retinal pigment epithelial cells expressing human CNTF. The findings from two phase 3 clinical trials suggested that NT-501 was generally well tolerated in adults with MacTel for 24 months after intraocular implantation. The timing of the ocular TEAEs reported in these trials may provide insight into which ocular TEAEs are expected surgical events, events unique to the device, events unique to CNTF, or unexpected delayed-onset events.
**Methods:** Participants who enrolled in the two phase 3 studies were randomized 1:1 to have NT-501 implanted or to undergo a sham surgery in the study eye. The study protocol, protocol amendments, and consent forms were reviewed and approved by a duly constituted independent ethics committee or institutional review board before study initiation. Safety assessments were based on AEs and ophthalmic exams. The safety data from these two phase 3 trials were integrated for a pooled analysis. Ocular TEAEs and serious AEs (SAEs) were stratified based on the time of TEAE onset after surgery: ≤90 days, 91–365 days, or ≥366 days. Delayed dark adaptation was reported based on participant response to direct query about their perceived changes in dark adaptation during the implant/sham site exam. Miosis events included reported AEs and events captured as part of the ophthalmic exams. Incidence rates for cataracts were also reported and stratified by the same time periods. All safety data reported herein were from the study eyes.
**Results:** Among the 239 participants with MacTel who enrolled in the two phase 3 trials, 228 (95.4%) participants underwent surgery (NT-501, n=117; sham, n=111) and were evaluated in the safety analyses. More ocular TEAEs occurred within 90 days of surgery compared with 91–365 days and ≥366 days (**Table 1**). Within 90 days of surgery, 86 (73.5%) eyes in the NT-501 group and 63 (56.8%) eyes in the sham group experienced at least one ocular TEAE, the most common being conjunctival hemorrhage, foreign body sensation in the eye, and eye pain. Between 91 and 365 days after surgery, at least one ocular TEAE occurred in 40 (34.2%) eyes in the NT-501 group and 18 (16.2%) eyes in the sham group, with the most common eye disorders that occurred being delayed dark adaptation, miosis, and dry eye. More than 365 days after the surgery, 37 (31.6%) eyes in the NT-501 group and 23 (20.7%) eyes in the sham group experienced an ocular TEAE, with the most common eye disorders being miosis, dry eye, and delayed dark adaptation. On average, delayed dark adaptation and miosis occurred in the study eye at about 29 and 358 days, respectively, after NT-501 surgery based on the timing of 16 delayed dark adaptation events and 22 miosis events. An additional delayed dark adaptation event occurred 55 days after surgery in a participant in the sham group. Across both phase 3 trials, 18 miosis events were considered clinically significant and all other miosis events were not clinically significant or resolved. Cataracts occurred or worsened in three participants (all in the NT-501 group) ≤90 days after surgery, in four participants (NT-501, n=3; sham, n=1) 91–365 days after surgery, and in nine participants (NT-501, n=6; sham, n=3) ≥366 days after surgery. A total of six participants in the NT-501 group experienced ocular SAEs, including one suture-related complication occurring ≤90 days after surgery, two suture-related complications occurring 91–365 days after surgery, and two suture-related complications and one device extrusion occurring ≥366 days after surgery.
**Conclusion:** Most ocular TEAEs that occurred ≤90 days after surgery were related to surgery, were expected, and occurred with similar frequency between eyes treated with NT-501 and eyes that underwent sham surgery. Most ocular TEAEs that occurred 91–365 days after surgery, including delayed dark adaptation and miosis, almost exclusively occurred in the NT-501 eyes and were related to CNTF. Most cataract AEs occurred ≥366 days after surgery. All but one of the six ocular SAEs reported in eyes of the participants in the NT-501 group were suture-related complications.


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| Treatment-emergent adverse events in study eye, n (%) | NT-501 (n=117) | Sham (n=111) |
|---|---|---|
| **≤90 days** | | |
| Conjunctival hemorrhage | 35 (29.9) | 30 (27.0) |
| Foreign body sensation in eyes | 19 (16.2) | 14 (12.6) |
| Eye pain | 19 (16.2) | 10 (9.0) |
| Conjunctival hyperemia | 13 (11.1) | 9 (8.1) |
| Delayed dark adaptation | 16 (13.7) | 1 (0.9) |
| **91–365 days** | | |
| Delayed dark adaptation | 8 (6.8) | 1 (0.9) |
| Miosis | 7 (6.0) | 0 |
| Dry eye | 3 (2.6) | 3 (2.7) |
| Visual impairment | 0 | 5 (4.5) |
| Vitreous floaters | 5 (4.5) | 0 |
| **≥366 days** | | |
| Miosis | 7 (6.0) | 0 |
| Dry eye | 3 (2.6) | 2 (1.8) |
| Delayed dark adaptation | 3 (2.6) | 1 (0.9) |
| Blurred vision | 2 (1.7) | 1 (0.9) |
| Choroidal neovascularization | 1 (0.9) | 2 (1.8) |
| Eye pain | 1 (0.9) | 2 (1.8) |
| Subcapsular cataract | 3 (2.6) | 0 |

Table 1. Most Common Ocular TEAEs Stratified by Timing of Event Onset

**8/02/2025**

**Elevated Short-Term Risk of Stroke Following Retinal Artery Occlusion: A Large Integrated Health System Analysis**


- Robin Vora, MD
- Hannah El-Sabrout, BS
- Daniel Lee, BS
- Ronak Shah, MD
- Nikita Vora, BS
- Mubarika Alavi, MS
- Mary Reed, DrPH
- Dana Sax, MD
- Amar Patel, MD
- Aubrey Gilbert, MD-PhD



**Objective:** What is the short-term cardiovascular risk following retinal artery occlusion, and how does it vary by RAO subtype?
**Purpose:** RAO may be an underrecognized harbinger of acute systemic vascular disease. While the association between RAO and stroke has been previously described, population-level, time-specific incidence rates are not well characterized. This study quantifies the short-term incidence of stroke and MI following RAO, compares risk across RAO subtypes, and provides time-specific incidence rate ratios (IRRs) to guide triage urgency.
**Methods:** A retrospective cohort study was conducted using data from Kaiser Permanente Northern California. Patients ≥18 years with a confirmed diagnosis of central retinal artery occlusion (CRAO) or branch retinal artery occlusion (BRAO) within 30 days of symptom onset between January 1, 2011 and December 31, 2023 were considered. Stroke and MI events were identified via ICD codes from emergency and inpatient encounters. Poisson regression with log link function was used to estimate incidence rate ratios (IRRs) comparing multiple post-RAO intervals (e.g., day of RAO, days 1–30, 31–90, etc.) to a patient-specific control period. Subgroup analyses were performed for BRAO and CRAO cohorts.
**Results:** Among 1,408 patients (CRAOs = 629, Jan 2011-Dec 2023); BRAOs = 779, Oct 2015-Dec 2023), the unadjusted IRR for stroke in the CRAO cohort was highest on the day of the RAO event (IRR ≈ 9.2), followed by the first 30 days (IRR ≈ 3.5), compared to baseline risk (Figure 1). Stroke risk was consistently higher than MI risk during early post-event intervals. In subgroup analysis, both CRAO and BRAO conferred elevated short-term stroke risk, but BRAO demonstrates higher stroke risk between 1-30 days after event (IRR≈6.4) (Figure 1). The elevated vascular risk declined over time, approaching baseline by 3 months post-RAO.
**Conclusion:** RAO is associated with a markedly increased risk of stroke, particularly on the day of the event and within the first month. These findings underscore the need for urgent systemic vascular evaluation of all patients with RAO and support classification of RAO as a neuro-ophthalmic emergency.


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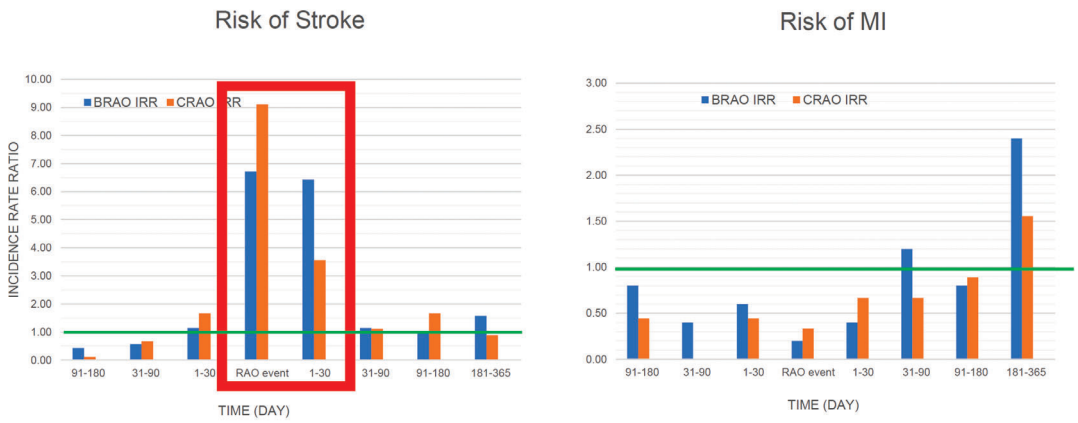
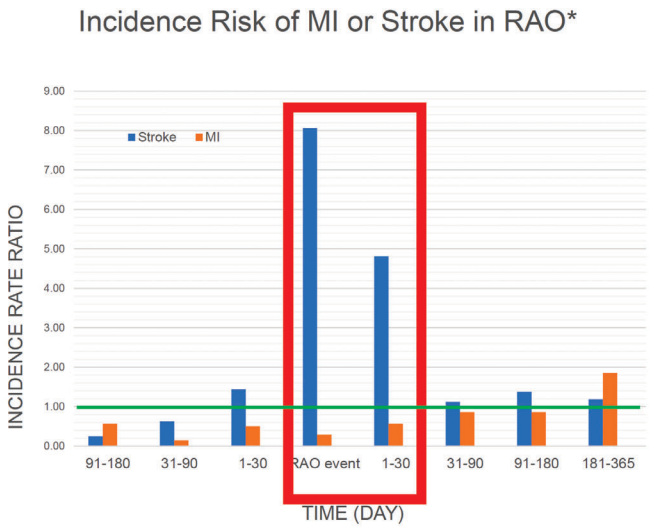
# Risk of stroke or MI in BRAO or CRAO




*Poisson log model to estimate IRR

Short-term stroke and MI risk following BRAO or CRAO event.

# Risk of stroke or MI in all **RAO** patients (total cohort)




*Poisson log model to estimate IRR

Stroke and MI risk in all RAO patients

**8/02/2025**

**Retinal Vascular Disease Symposium 1**

# Visual Recovery in Patients With Central Retinal Artery Occlusions Treated With Intravenous Thrombolysis


- Bobeck Modjtahedi, MD
- Daniel Chen, BS
- Alex Vo, DO
- Seungyong Han, PhD
- Navdeep Sangha, MD



**Objective:** To evaluate visual outcomes in patients with central retinal artery occlusions (CRAOs) treated with intravenous thrombolysis.
**Purpose:** There is currently no generally accepted consensus on the treatment of vision loss secondary to acute CRAOs, with prior studies failing to demonstrate visual recovery after various therapeutic approaches. Intravenous thrombolysis is the accepted standard of care for acute ischemic stroke and may have potential in the management of CRAOs by inducing retinal reperfusion with resultant visual recovery. The purpose of this study was to compare visual outcomes between medical management (MM) and different thrombolytics administered for CRAO.
**Methods:** A retrospective cohort study was done of patients with acute CRAOs who presented with count fingers or worse vision. Patients who received intravenous thrombolysis, either tenecteplase (TNK) or tissue-plasminogen activator (tPA), were matched to those who received MM without thrombolysis following the diagnosis of CRAO. Patients were matched based on age, gender, hypertension (HTN), diabetes mellitus (DM), and hyperlipidemia (HLP) to create two similar cohorts. Thrombolytics were administrated only if patients presented within 4.5 hours of symptom onset. There were 78 patients included in the study, 39 who received thrombolysis (20 TNK and 19 tPA) and 39 who received MM. Visual acuity measures were assessed at the first visit after CRAO diagnosis and treatment (initial follow up). Average visual acuity (logMAR) and proportion of patients > 20/200 were the primary outcome measures. The proportion of patients $\geq$ 20/40 was the secondary outcome measure. Univariate three-way comparisons were done between patients who received TNK, tPA, and MM using chi-squared tests. Multivariate linear and logistic regressions were performed for continuous and categorical/binary outcomes, respectively, to estimate the effect of thrombolytic treatment after controlling for age, race, HTN, DM, HLP, and the use of non-thrombolytic interventions (e.g., ocular hypotensive drops, ocular massage, etc).
**Results:** Patients had similar baseline characteristics (Table 1), although DM was more common in patients who received tPA (52.6%) than MM (33.3%) or TNK (15.0%, p=0.049). Non-thrombolytic interventions were less commonly attempted in patients who received TNK (MM 28.2%, TNK 0%, tPA 31.6%, p=0.02). There was no significant difference in door-to-needle times between patients who received TNK and tPA (61.2 +/- 28.9 vs 68.5 +/- 44.0 minutes, p=0.54). There were no intracranial or intraocular hemorrhages in the one week after CRAO diagnosis in any patient. Patients underwent initial re-evaluation an average of 2.6 weeks after the diagnosis of CRAO/administration of treatment. Twenty percent of patients who received TNK had $\geq$ 20/40 vision at follow up whereas 5.1% of MM patients and 0% of tPA patients reached this threshold (chi-squared univariate p-value=0.07). Logistic regression models for the outcome failed to estimate an odds ratio (OR) and 95% confidence intervals (CIs) mainly due to small sample size and the rarity of outcome events in the MM and tPA groups. Results of regression analyses are presented in Table 2. Patients who received TNK had better average visual acuity after treatment (logMAR 1.54 +/- 0.93) than those who received tPA (logMAR 1.97 +/- 0.50) and MM (logMAR 2.04 +/- 0.70). On multivariate linear regression, patients who received TNK were found to have significantly better vision on follow-up by 0.58 logMAR compared to MM patients (95% CI -1- -0.14, p-value=0.01) whereas the difference between tPA and MM was not significant (-0.03 logMAR, 95% CI -0.45-0.39, p=0.89). Thirty percent of patients who received TNK achieved > 20/200 vision on follow up, compared to 12.8% of MM patients and 10.5% of tPA patients. Multivariate logistic regression demonstrated that TNK use was significantly associated with higher odds of achieving > 20/200 vision compared to MM (OR 6.74, 95% CI 1.25-46.8, p-value 0.035) without a significant difference between tPA and MM (OR 0.69, 95% CI 0.08-4.26, p=0.71).
**Conclusion:** Patients who received TNK had better visual outcomes compared to those who received MM for acute CRAOs; however, there did not appear to be a benefit with the use of tPA. Although this analysis was limited by study size, this is the first study comparing two different thrombolytic agents (TNK and tPA) to MM and is one of largest studies of intravenous thrombolysis to date that has utilized regression analyses to control for other important covariates to isolate the effect of thrombolysis on visual outcomes while reducing the risk of confounding. TNK may have value in the management of acute CRAOs and should be further explored.


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Table 1: Baseline characteristics

| | MM (N= 39) | TNK (N= 20) | tPA (N= 19) | p-value |
|---|---|---|---|---|
| **Age at presentation** | | | | |
| <65 | 9 (23.1%) | 7 (35.0%) | 6 (31.6%) | 0.62 |
| 65 | 30 (76.9%) | 13 (65.0%) | 13 (68.4%) | |
| **Gender** | | | | |
| Female | 16 (41.0%) | 8 (40.0%) | 8 (42.1%) | 1.00 |
| Male | 23 (59.0%) | 12 (60.0%) | 11 (57.9%) | |
| **Race/Ethnicity** | | | | |
| American Indian/Alaska Native | 0 (0%) | 0 (0%) | 1 (5.3%) | 0.11 |
| Asian | 1 (2.6%) | 5 (25.0%) | 4 (21.1%) | |
| Black/African American | 7 (17.9%) | 2 (10.0%) | 3 (15.8%) | |
| Decline to State | 0 (0%) | 1 (5.0%) | 0 (0%) | |
| Hispanic/Latino | 11 (28.2%) | 5 (25.0%) | 3 (15.8%) | |
| White | 20 (51.3%) | 7 (35.0%) | 8 (42.1%) | |
| **Hypertension** | | | | |
| No | 10 (25.6%) | 7 (35.0%) | 3 (15.8%) | 0.37 |
| Yes | 29 (74.4%) | 13 (65.0%) | 16 (84.2%) | |
| **Diabetes mellitus** | | | | |
| No | 26 (66.7%) | 17 (85.0%) | 9 (47.4%) | 0.049 |
| Yes | 13 (33.3%) | 3 (15.0%) | 10 (52.6%) | |
| **Hyperlipidemia** | | | | |
| No | 6 (15.4%) | 5 (25.0%) | 1 (5.3%) | 0.22 |
| Yes | 33 (84.6%) | 15 (75.0%) | 18 (94.7%) | |
| **Non-thrombolytic interventions** | | | | |
| No | 28 (71.8%) | 20 (100%) | 13 (68.4%) | 0.02 |
| Yes | 11 (28.2%) | 0 (0%) | 6 (31.6%) | |
| **Door to needle (min)** | | | | |
| Mean (SD) | N/A | 61.2 (28.9) | 68.5 (44.0) | 0.54* |
| Median [Min + Max] | N/A | 53.0 [23.0 + 124] | 47.0 [25.0 + 156] | |
| IQR [Q1 + Median + Q3] | N/A | 35.3 [44.3 + 53.0 + 79.5] | 55.0 [41.5 + 47.0 + 96.5] | |

* p-value for door to needle is based on independent samples t-test

MM=medical management, TNK= tenecteplase, tPA=tissue plasminogen activator

Table 1

Table 2: Multivariate regression analyses of visual outcomes at initial follow-up evaluation following central retinal artery diagnosis/treatment

| | Average logMAR | | | Proportion of patients >20/200 | | |
|---|---|---|---|---|---|---|
| | Beta | 95% CI | p-value* | OR | 95% CI | p-value** |
| **Treatment** | | | | | | |
| MM (reference group) | — | — | | — | — | |
| TNK | -0.58 | -1.0, -0.14 | 0.01 | 6.74 | 1.25, 46.8 | 0.035 |
| tPA | -0.03 | -0.45, 0.39 | 0.89 | 0.69 | 0.08, 4.26 | 0.71 |
| **Age at presentation** | | | | | | |
| <65 | — | — | | — | — | |
| 65 | 0.25 | -0.18, 0.69 | 0.25 | 0.59 | 0.11, 3.53 | 0.55 |
| **Gender** | | | | | | |
| Female | — | — | | — | — | |
| Male | 0.15 | -0.23, 0.53 | 0.44 | 0.4 | 0.07, 1.88 | 0.26 |
| **Race/Ethnicity** | | | | | | |
| Non-White | — | — | | — | — | |
| White | -0.04 | -0.42, 0.33 | 0.82 | 1.84 | 0.39, 9.66 | 0.44 |
| **Hypertension** | | | | | | |
| No | — | — | | — | — | |
| Yes | 0.22 | -0.20, 0.64 | 0.30 | 0.42 | 0.09, 2.02 | 0.27 |
| **Diabetes mellitus** | | | | | | |
| No | — | — | | — | — | |
| Yes | -0.01 | -0.43, 0.40 | 0.95 | 1.11 | 0.18, 6.42 | 0.91 |
| **Hyperlipidemia** | | | | | | |
| No | — | — | | — | — | |
| Yes | -0.28 | -0.86, 0.30 | 0.34 | 2.91 | 0.30, 40.7 | 0.39 |
| **Non-thrombolytic intervention** | | | | | | |
| No | — | — | | — | — | |
| Yes | -0.35 | -0.83, 0.14 | 0.16 | 7.18 | 0.97, 66.3 | 0.06 |

*Linear regression

**Logistic regression

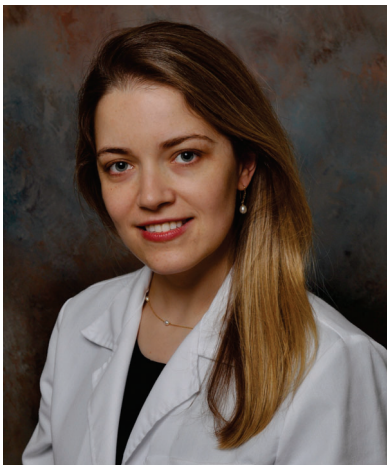
MM=medical management, TNK= tenecteplase, tPA=tissue plasminogen activator

Table 2

**8/02/2025**

**Retinal Vascular Disease Symposium 1**

# The Impact of Glucagon-Like Peptide-1 Receptor Agonists on the Risk of Retinal Vein and Artery Occlusions




- Aleksandra Rachitskaya, MD, FASRS
- Nadia Abbass
- David Kaelber, MD, PhD, MPH
- Rishi Singh, MD
- Katherine Talcott, MD
- Kevin Allan, MD, PhD



**Objective:** This study seeks to examine the effects of the glucagon-like peptide-1 receptor agonists (GLP-1RA) on retinal vascular occlusions utlizing a large electronic health record platform.
**Purpose:** Retinal vascular occlusions, such as retinal vein and artery occlusion (RVO and RAO), are sight-threatening events with several modifiable chronic disease risk factors. Glucagon-like peptide-1 receptor agonists (GLP-1RA) have been shown to mitigate many of these risk factors including obesity, type 2 diabetes mellitus (T2DM), hypertension, hyperlipidemia, and coronary artery disease. Additionally, GLP1-RA have been reported to exert protective effects in conditions such as diabetic retinopathy and age-related macular degeneration. The purpose of this study is to investigate whether GLP-1RA reduce the risk of retinal vascular occlusions.

**Methods:** This study utilized an electronic health record platform including over 120 million patients in the United States. Patients ≥ 18 years old with both a GLP-1RA prescription and ophthalmology follow up for at least 3 years were included. Controls, with at least 3 years of an insulin prescription and ophthalmology follow up, were propensity score matched (1:1) on demographics and chronic disease risk factors. Survival, hazard ratios (HR) and 95% confidence intervals (CI) were calculated and reported.

**Results:** After propensity score matching, 21,918 patients taking a GLP-1RA were compared to the same number of controls. 59% of the GLP-1RA group were female with an average age of 57 ± 11. The average BMI was 35.2 ± 7.6, 84% had T2DM and 11% had T1DM (mean HbA1c 8.3 ± 2.1). After 3 years, there was a significant reduction in the hazard of all retinal vascular occlusions (HR 0.62, 95% CI 0.51-0.76), all RVOs (HR 0.72, 0.57-0.90), all RAOs (HR 0.50, 0.32-0.77), central RVOs (HR 0.67, 0.50- 0.90), branch RVOs (HR 0.57, 0.42- 0.76), and branch RAOs (HR 0.57, 0.35- 0.94). Central RAOs (HR 0.64,0.33-1.24) demonstrated a non-significant risk decrease. Outcomes were also compared at 1 and 5 years, revealing consistently decreased hazard of all outcomes at all time points.

**Conclusion:** These results suggest that GLP-1RA may reduce the risk of retinal vascular occlusions. Given the established benefit in cardiac, kidney, and neurodegenerative disease, this protective effect is likely mediated by risk factor reduction and anti-inflammatory properties. Additional prospective research and analysis of long-term outcomes is needed to further investigate this association.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**8/02/2025**

**Retinal Vascular Disease Symposium 1**

# Identification of Risk Factors Associated With Development or Progression of Proliferative Sickle Cell Retinopathy


- Adrienne Scott, MD, FASRS
- Anshuman Agrawal, BS
- Nur Cardakli, MD
- Anupam Garg, MD, PhD



**Objective:** To predict the risk of development or progression of proliferative sickle cell retinopathy (PSR).
**Purpose:** Sickle cell disease (SCD), an inherited hemoglobinopathy affecting approximately 7.74 million people globally, can lead to retinal disease and irreversible vision loss. Sickle cell retinopathy (SCR) is classified into proliferative (PSR) and non-proliferative (NPSR) forms, identified by the presence or absence of neovascularization. It is further staged using the Goldberg system (Stage I-V, with PSR = Stages III to V). Vision loss is typically associated with progression to advanced PSR stages, characterized by vitreous hemorrhage (Stage IV) and retinal detachment (Stage V). However, data regarding risk factors for progression from NPSR to PSR and among the PSR stages remain limited. With the recent approval of systemic disease-modifying therapy, it is critical to better characterize the natural history vision loss from SCR to evaluate the impact of disease-modifying therapies.

**Methods:** We retrospectively reviewed the electronic medical records of patients with SCR evaluated at a tertiary retina practice from July 1, 2013, to June 30, 2023. Collected data included demographics (sex, race/ethnicity, date of birth), sickle cell genotype, visual acuity at diagnosis, Goldberg stage at diagnosis and most recent follow-up, and the presence of comorbidities (diabetes, glaucoma). Laboratory data (hematocrit levels), details on disease-modifying treatments (hydroxyurea, chronic red cell exchanges, blood transfusions), and smoking history (current/lifetime) were also extracted. SCR staging was determined primarily via imaging (fluorescein angiography, fundus photography) or, when unavailable, clinical exam findings. Progression was defined as a transition from NPSR to PSR or advancement within PSR (Stage III to IV/V or Stage IV to V). We employed univariate, multivariate, and backward elimination-based stepwise multivariate Cox proportional hazards models including the aforementioned variables to identify significant predictors for progression. Additional imaging-based analyses are ongoing. The study was conducted under an institutional review board-approved protocol.

**Results:** A total of 530 eyes from 271 patients (45% male) were included, with 96% self-identifying as Black or African American. Sickle cell genotype distribution was 48% HbSC, 40% HbSS, 9% beta-thalassemia, and 3% other. The mean follow-up was $4.8 \pm 4.5$ years, and the mean age at presentation was $33.1 \pm 13.7$ years. A smoking history was present in 28% of patients. Of 288 eyes initially diagnosed as NPSR, 29 eyes (10%) progressed to PSR; within this subgroup, HbSS was most common (56% overall and 66% among progressed eyes). Among 242 eyes initially diagnosed as PSR, 35 eyes (15%) advanced to a more severe stage; here, HbSC was predominant (75% overall and 80% among progressed eyes). In the analysis of progression from NPSR to PSR, four potential factors were initially identified ($p < 0.3$), and multivariate analysis revealed that a history of ever smoking was associated with an increased risk (hazard ratio [HR] 2.39, 95% confidence interval [CI] [1.10, 5.17], $p = 0.027$), whereas chronic red cell exchanges were protective for SCR progression (HR 0.23, 95% CI [0.07, 0.77], $p = 0.033$). Additionally, worse visual acuity at diagnosis trended toward increased risk (HR 3.36, 95% CI [0.81, 13.87], $p = 0.09$). For eyes progressing within PSR stages, univariate analysis identified five potential risk factors, but on multivariate analysis, only ongoing smoking at the time of PSR diagnosis remained statistically significant (HR 2.38, 95% CI [1.03, 5.49], $p = 0.043$). Older age at presentation showed a weak protective trend (HR 0.97, 95% CI [0.94, 1.00], $p = 0.09$).
**Conclusion:** Progression from NPSR to PSR occurred in 10% of eyes with NPSR, and was more common among patients with HbSS, while 15% of eyes with PSR advanced to more severe stages. These findings underscore the need for regular monitoring and timely intervention to prevent PSR progression and vision loss. Notably, a current or lifetime smoking history significantly increased the risk of SCR progression, whereas chronic red cell exchanges appeared protective. Data analysis is ongoing to better understand the role of systemic disease modifying therapies on SCR progression. To our knowledge, this study represents the largest single-center dataset of patients with SCR. Future research should focus on multi-center collaborations, leveraging imaging data and machine learning to enhance risk stratification and optimize management strategies.


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**Retinal Vascular Disease Symposium 1**

# Surgical Outcomes for Proliferative Sickle Cell Retinopathy


- Hesham Gabr, MD
- Felix Chau, MD
- Lawrence Ulanski, MD
- Yannek Leiderman, MD, PhD, FASRS
- William Mieler, MD, FACS, FARVO
- Jennifer Lim, MD, FARVO, FASRS



**Objective:** This study explores the visual and anatomical long-term outcomes of vitreoretinal surgery for eyes with complications related to stage III or higher proliferative sickle cell retinopathy (PSR).

**Purpose:** To explore indications, surgical intervention, complications, and outcomes of vitreoretinal procedures for proliferative sickle cell retinopathy (PSR) patients.
**Methods:** We performed a retrospective review of sickle cell patients who underwent vitreoretinal procedures at the University of Illinois from January 2011 to May 2024 for treatment of PSR. Data collected included demographic and hematologic baseline information, indications for surgery, type of surgical procedure, preoperative and postoperative best-corrected visual acuity (BCVA), anatomic postoperative outcomes, and duration of follow-up.

**Results:** A total number of 208 patients were diagnosed with sickle cell retinopathy during the study period. Of the 208 patients, 24 patients underwent a vitreoretinal procedure for complications related to PSR. Of the 24 patients, 4 patients were excluded due to missing preoperative data because prior surgery had been performed elsewhere. There were 22 eyes of 20 patients (11 men and 9 women) with a mean age of 57.5 years (range: 20–67) included in this series. Hemoglobin (Hgb) subtypes included HgbSC in 15 and HgbSS in 5 patients. Indications for surgical intervention included vitreous hemorrhage (VH, 8), epiretinal membrane (ERM, 2), traction retinal detachment (TRD, 6), rhegmatogenous retinal detachment (RRD, 5), combined TRD-RRD (1).
Surgical procedures included 25-gauge pars plana vitrectomy (PPV) with gas and endolaser [11 (C3F8-6, SF6- 3, air-2)], PPV with endolaser and no gas (10), and laser retinopexy (1). The mean postoperative follow-up duration was 51 months (median 42 months, range 4–156 months). Only 2 patients (4 months and 6 months follow-up) had follow-up less than 11 months.
For the eyes with RDs, mean BCVAs improved from 20/100 preoperatively to 20/40 postoperatively. For the eyes without RD (VH and ERM), mean BCVAs improved from 20/100 preoperatively to 20/30 postoperatively. Compared to preoperative BCVA, the best postoperative BCVA was stable in 6/22 eyes (27%) or improved in 16/22 eyes (73%) and decreased (≥ 3 lines worsened from baseline BCVA) in no eyes . Overall, compared to preoperative BCVA, the final postoperative BCVA was stable in 7/22 (32%) eyes, improved in 14/22 (64%) eyes and decreased in 1/22 (4%) eye. There were 4 eyes that had a decrease in vision from their best post-operative BCVA as compared to their final BCVA due to cataract and an ERM (2), herpetic corneal ulcer (1) and anterior uveitis (1). All eyes (14/14) which had a VH had an improvement in both best postoperative and final BCVA compared to baseline. This was true even for eyes with TRD and RRD if a vitreous hemorrhage was present. In addition, we found postoperative morbidities occurred in 9/22 (40%) of the patients. These included postoperative visually significant cataracts (3), ERMs (2), uveitis (1) and recurrent RDs (3). All eyes with recurrent RDs underwent successful repair.

**Conclusion:** Surgical intervention for eyes with retinal complications related to PSR results in favorable anatomic and visual acuity outcomes; long term follow-up is needed to detect morbidities related to ocular ischemia.


**IRB APPROVAL**