

What are the similarities and differences in trends comparing the risk factors, treatment methods, and outcomes for people younger than 50 who have central vein occlusion (CRVO) and branch vein occlusion (BRVO)? During the summer of 2019, I worked with Dr. Adam Murtaza at Colorado Retina Associates to conduct an in-depth retrospective chart analysis of the trends of young patients with branch retinal and central retinal vein occlusion, two disorders of the retina that can lead to anything from painless blurred vision to total blindness. Both disorders, known collectively as retinal vein occlusion (RVO), result from the blockage of veins in the eye due to blood clots or narrowing; in BRVO these are the retinal veins that stem from the eye's central vein, while in CRVO, which is much more serious, the central vein itself is blocked from passing blood. People over the age of 50 are more likely to experience some form of retinal vein occlusion as a complication of aging. However, there is a growing trend of both disorders in younger people, though research on this younger demographic is minimal. I wanted to shed importance on the reason for this phenomenon, as my mother had CRVO in her 20's and was at risk of total blindness.

After completing an online course that grants CITI Program Certification for Research under Sterling IRB, I was able to access data sets from Colorado Retina patients who had or have branch retinal and/or central retinal vein occlusion, including their sex, age, eye checkup information, and ultra-widefield fundus imaging (internal photographs of the veins in the eye). With Dr. Murtaza's help, I conducted an in-depth Excel data analysis of the characteristics of 176 patients younger than 50, comparing those who had BRVO compared to those who had CRVO. This was done to define major trends in terms of risk factors (which included lifestyle choices like smoking and drinking as well as comorbidities like diabetes and hypertension), treatment (an Avastin injection, which hinders additional blood clot growth in the eye), and outcomes for intraocular pressure (IOP) and visual acuity (VA). After collecting and organizing the data, I created color-coded bar graphs to visualize the different CRVO and BRVO effects and compare the way the two disorders manifest in this sample of patients. On average, BRVO patients were affected at a younger age than CRVO patients by about 3 years. They were more likely to smoke, drink, and have hypertension connections than CRVO patients were. CRVO patients, on the other hand, were more likely to have diabetes and glaucoma connections, and they were also more likely to have had an Avastin injection. BRVO is correlated with lifestyle choices while CRVO is correlated with genetic/comorbid health conditions.

Intraocular pressure—which, when too high, can damage the optic nerve and affect visual acuity—decreased for patients with CRVO after treatment, while it increased for BRVO patients. This indicates that Avastin injections are currently more effective for CRVO patients. Indeed, CRVO patients could see better than BRVO patients could with the same eye. CRVO correlates with less preventable, possibly genetic factors like glaucoma, diabetes, blood clots, iron deficiency, and surgery, but it is more receptive to the Avastin treatment than BRVO. BRVO, meanwhile, is less

treatable but has a stronger correlation to factors that are within a patient's control, namely drinking and smoking.

Among the patients whose data I analyzed, the youngest to have RVO was a 10-year-old girl. Young patients like her may be in the minority, but they have to live their entire lives with the potentially debilitating effects of this disease. I undertook this research project in order to open a door to future study of RVO among younger demographics—not only to raise awareness of its existence and its correlations with both lifestyle and genetic factors, but to develop treatments that can save the eyesight of young and old patients alike.