Patients with glaucoma often report reduced health-related quality of life (HRQOL). Clinical factors associated with reduced HRQOL for these patients, however, are still poorly understood.

In research published in *JAMA Ophthalmology* in 2018, Cheryl L. Khanna, M.D., David A. Leske, M.S., and Jonathan M. Holmes, M.D., conducted a study of patients with glaucoma who were medically and surgically treated at Mayo Clinic’s campus in Rochester, Minnesota, to determine the factors associated with reduced HRQOL. Of the 160 study participants, 73 were medically treated, 51 received trabeculectomy and 36 received glaucoma drainage device surgery. Patients who received both trabeculectomy and glaucoma drainage device surgery were analyzed in the glaucoma drainage device surgery group.

**Diplopia and strabismus**
In a previous study published in *Ophthalmology* in 2017, the team reported that diplopia and strabismus are common in patients with glaucoma and more frequent when treated with glaucoma drainage devices. In the present study, factors associated with reduced HRQOL were assessed using two HRQOL instruments: the strabismus–specific Adult Strabismus-20 (AS-20) Questionnaire and the National Eye Institute Visual Function Questionnaire (VFQ-25). Diplopia was formally quantified using the diplopia questionnaire.

**Factors associated with reduced HRQOL**
The present study reports that reduced HRQOL is common in surgically and medically treated patients with glaucoma and poor HRQOL in patients with glaucoma is associated with:
- Worse diplopia
- Lower mean deviation on visual field testing in either eye
- Decreased visual acuity in either eye
- Younger age
- Previous glaucoma drainage device surgery

**Treatment effects**
When accounting for visual acuity, visual field loss, diplopia, age and sex in adjusted analyses, comparing glaucoma drainage device surgery with trabeculectomy, lower HRQOL was found in patients treated with glaucoma drainage device surgery on the self-perception, interactions and general function subscales of the AS-20. Trends toward lower scores were also found on both VFQ-25 subscales (socio-emotional and visual functioning), although these differences did not reach significance.

When comparing glaucoma drainage device surgery with medical treatment, HRQOL was lower following glaucoma drainage device surgery for the self-perception and interactions subscales of the AS-20. Scores were lower on both VFQ-25 subscales, but this difference did not reach statistical significance.

**Patients’ negative self-perception with glaucoma drainage devices**
Reduced AS-20 self-perception and interactions subscale scores in patients who have undergone glaucoma drainage device surgery highlight the specific negative impact in these patients. Patients appear to be self-conscious of the device and may feel the physical presence or have a psychological awareness of the device.
Ocular Manifestations in Post-Transplant Lymphoproliferative Disorder: A Case Report

Although post-transplant lymphoproliferative disorder (PTLD) is the most common malignancy complicating solid organ transplantation, it has rarely been associated with ocular manifestations. Review indicates that only 20 cases of ocular PTLD have been reported in the literature.

In 2018, a multidisciplinary team comprising four subspecialties — pediatric ophthalmology, ocular oncology, pediatric oncology and pediatric transplant — at Mayo Clinic’s campus in Rochester, Minnesota, reported on its successful treatment of a case of bilateral ocular involvement by PTLD with histopathologic features of extranodal marginal zone (MALT) lymphoma in an 8-year-old boy following orthotopic heart transplantation. The anterior segment disease was treated successfully using a combination of intraocular and systemic injections of humanized anti-CD20 antibody (rituximab). Results were published in the Journal of AAPOS.

**Ocular signs and symptoms, five years post-surgery**

The patient, an 8-year-old boy, underwent orthotopic heart transplantation at 3 years of age for decompensated heart failure following presumed viral myocarditis.

His initial postoperative recovery was complicated by primary graft dysfunction, from which he recovered, and bilateral cerebrovascular accidents that resulted in bilateral hemiparesis and right visual field loss. Over the following year, he developed chronic low-grade Epstein-Barr virus (EBV) viremia that peaked at 19,800 copies/mL of whole blood, with concurrent elevation of liver enzymes, attributed to EBV hepatitis, which resolved following reduction of his immunosuppression.

Five years following transplant surgery, he presented at Mayo Clinic for persistent bilateral eye redness and rubbing. On examination, visual acuity in both eyes was 20/40. There was bilateral minimal conjunctival injection, small keratic precipitates in the right eye and larger mutton-fat keratic precipitates in the left eye, bilateral anterior chamber (AC) cellular reaction with flare, and multiple iris nodules in the left eye. Posterior segment examination was normal in each eye.

Biopsy of one of the left iris nodules revealed an infiltrate of small CD20-positive B cells with intermixed plasma cells that had restricted, monoclonal expression of kappa immunoglobulin light chains and absence of lambda light chains. The lesion was diffusely positive for EBV on immunohistochemical studies. The proliferating cells were small, with morphology resembling extranodal marginal zone lymphoma. A diagnosis of post-transplant lymphoproliferative disorder with marginal zone lymphoma-like features was made.

**Intraocular and systemic rituximab injections**

Lacking improvement following topical steroids and stopping mycophenolate mofetil, treatment with the anti-CD20 antibody, rituximab, was initiated. “Of the 20 previously reported cases, none received intraocular injections of rituximab and two received systemic injections,” says Jose S. Pulido, M.D., an ocular oncologist at Mayo Clinic’s campus in Rochester, Minnesota. “Rituximab has been increasingly used in treatment of CD20-positive PTLD in children, but there are very few reports on the use of intraocular rituximab.”

“We elected to combine systemic rituximab with intraocular injections because of limited evidence on the effectiveness of systemic rituximab in penetrating the blood-aqueous barrier — and because one of the two previously reported cases developed ocular PTLD despite previously receiving systemic injections,” says...
SCOPE Research Tracks Increased Use, Performance of Scleral Lenses

Since 2014, the Scleral Lenses in Current Ophthalmic Practice: An Evaluation (SCOPE) study group has worked to provide a better understanding of the role and performance of scleral lenses in clinical practice. Scleral lenses have traditionally been prescribed to address eye conditions that may not respond to other forms of treatment. Since 2010, however, scleral lenses have become increasingly prescribed for a broad range of applications in corneal irregularity, ocular surface disease and even for common uncomplicated refractive error.

“Because scleral lenses are more comfortable than corneal gas permeable (sometimes referred to as “hard”) lenses and provide vision that is just as clear as corneal rigid gas permeable lenses, they’re now being prescribed for a broad range of applications,” says study group founder Muriel M. Schornack, O.D., an optometrist at Mayo Clinic in Rochester, Minnesota. “We need a far better understanding of the issues, implications and long-term effects of this shift.”

“Our experience is that scleral lenses also carry a rigorous burden of care and long-term effects,” adds Cherie B. Nau, O.D., also an optometrist at Mayo Clinic, Rochester, Minnesota. “Scleral lenses can compress drainage channels in the eye and may be associated with conjunctival damage. The bigger concern is microbial keratitis — a potentially blinding complication. We suspect scleral lens wear may be associated with cases of microbial keratitis that have not yet been reported in the literature.”

To address these concerns, the SCOPE study group conducts research that helps document the shift toward expanded use of scleral lenses and the effects and implications of that expansion. Four recent studies include:

**How to quantify midday fogging**

One of the issues associated with scleral lens wear is “midday fogging,” a phenomenon that occurs when debris becomes entrapped in the fluid reservoir that is maintained between the lens and the cornea. This study evaluated a method to quantify increases in turbidity of the post-lens fluid reservoir by assessing changes in optical density of the fluid over time and compared these changes during two hours of scleral lens wear using three different lens designs. Outcomes indicated:

**For more information**

Shakila P. Khan, M.D., a pediatric oncologist at Mayo Clinic in Rochester, Minnesota. “We chose not to use intraocular injections as monotherapy, because there are no reports on exclusive use of this route to treat ocular PTLD.”

The patient showed complete response initially to this combination but had a recurrence of keratic precipitates and AC cellular reaction several months later. “We cannot be certain whether that represented a true recurrence, but we elected to treat with further intraocular injections and no systemic injections,” says Erick D. Bothun, M.D., a pediatric ophthalmologist at Mayo Clinic in Rochester, Minnesota. “We opted to inject methotrexate intraocularly as well, which may or may not have contributed to improvement.” On final follow-up, eight months after the initial injection, the patient had not developed any signs of ocular toxicity.

One week following his last injections, both the AC cellular reaction and the iris masses had resolved. Improvement continued for three months, at which point AC reaction and keratic precipitates recurred bilaterally. An AC tap was negative for malignancy.

The patient was further treated with a single intravitreal injection of rituximab and a single injection of methotrexate in each eye. Within two weeks, keratic precipitates resolved completely, and he was left with trace AC cellular reaction, successfully controlled with topical corticosteroids. Four months later, the patient maintained this improvement. He had no keratic precipitates or AC reaction in either eye and visual acuity of 20/30 in both eyes.

“The success of this treatment regimen was a direct result of collaboration and coordination by our subspecialists in our multidisciplinary environment,” says Sanjay V. Patel, M.D., chair of Ophthalmology at Mayo Clinic in Rochester, Minnesota. “Each contributed expertise that helped ensure the best possible course of treatment and outcome for this patient.”

Sanjay V. Patel, M.D.

Jose S. Pulido, M.D.

Cherie B. Nau, O.D.

Muriel M. Schornack, O.D.
• Optical density of the post-lens fluid reservoir can be quantified during scleral lens wear.
• During two hours of wear, fluid reservoir optical density doubled with all lens designs evaluated.

Assessing current scleral lens use for guideline development
This study assessed current scleral lens prescription and management practices via an international online survey of eye care providers. Researchers concluded:
• A reasonable degree of consensus exists regarding some aspects of scleral lens prescription and management (average lens diameter, daily wearing time and use of nonpreserved products for lens application).
• Further study is needed to develop evidence-based guidelines for scleral lens prescription and management.

Use of scleral lenses for corneal irregularity and ocular surface disease
This study describes current practice patterns regarding the use of scleral lens therapy in the management of corneal irregularity and ocular surface disease among eye care providers who fit scleral lenses. Outcomes include:
• Scleral lenses rank second only to corneal rigid, gas permeable lenses for management of corneal irregularity.
• Scleral lenses are generally considered after other medical intervention and before surgery for the management of ocular surface disease.

Who prescribes scleral lenses and for what conditions?
This study reports demographic characteristics of scleral lens providers and indications for scleral lens prescription as assessed by a worldwide online survey. Results indicate:
• Eye care providers of all ages are fitting scleral lenses.
• The number of individuals who fit this lens modality has increased during the past decade.
• Providers in a wide range of practice settings are fitting scleral lenses.
• Most scleral lenses are prescribed for corneal irregularity.

Future research
The SCOPE study group has two studies before an institutional review board: One addresses patients with ocular hypertension, and the second compares patient experience of scleral lenses with different peripheral designs.
For more information, contact Dr. Nau at nau.cherie@mayo.edu or Dr. Schornack at schornack.muriel@mayo.edu.