A variety of benign and malignant tumors occur in the conjunctiva. Some of them can be life-threatening: Conjunctival melanoma carries a 25% to 30% mortality rate (Figure). Population-based data on the incidence of these tumors provide important information for practicing physicians.

“Current population-based studies reviewing conjunctival melanoma, which originate mainly from Scandinavia, estimate the annual incidence to be between 0.06 and 0.52 cases per million. In other studies, the incidence of ocular surface squamous neoplasia (OSSN) has ranged from less than 0.1 cases per million in women in North America to 35 per million in Uganda,” says Lauren A. Dalvin, M.D., ocular oncologist with Ophthalmology at Mayo Clinic in Rochester, Minnesota. “And although there have been several large series examining conjunctival lesions in the United States, the reports are primarily from tertiary care centers, making them subject to referral bias.”

Using data from the Rochester Epidemiology Project, which captures more than 50 years of medical records from nearly all (148,201) residents of Olmsted County, Minnesota, Dr. Dalvin and a research team conducted a retrospective U.S. population-based study of conjunctival lesions. Results were published in the British Journal of Ophthalmology in 2018.

The research team searched the Rochester Epidemiology Project database to identify patients with conjunctival tumors in Olmsted County from Jan. 1, 1980, to Dec. 30, 2015, using unique codes from three sources:
- 25 Hospital International Classification of Diseases Adapted codes
- 24 International Classification of Diseases (ICD)-10 codes
- Eight ICD-9 codes

They then reviewed the records for demographics, types of tumors, histopathology, treatment and clinical course.

“Patients were only included if diagnoses were made or confirmed by an ophthalmologist or optometrist, and if they represented benign or malignant tumors,” says Dr. Dalvin. “Because our initial search criteria were broad, we reviewed all cases to ensure all tumors were included while excluding degenerative lesions, conjunctivitis, cysts, phlyctenules, pingueculae, pterygia, granulomata and depositions.

“Lesions were then divided into benign and malignant. While benign melanocytic lesions, such as primary acquired melanosis, can transform into malignant melanoma, these lesions were classified as benign and followed for transformation into melanoma during the study period. Malignant tumors were categorized as melanocytic (malignant melanoma), premalignant and malignant epithelial OSSN, lymphoma or Langerhans cell histiocytosis.”

More than 3,300 patients in Olmsted County were diagnosed with a conjunctival lesion in the study period. Medical record review confirmed the presence of a conjunctival lesion in 919 patients. Exclusions yielded 504 patients with conjunctival tumor.

Of those 504 patients, 248 (49%) were male; 383 (76%) were white, 50 (10%) were Asian, 0.06 and 0.52 cases per million. In other studies, the incidence of ocular surface squamous neoplasia (OSSN) has ranged from less than 0.1 cases per million in women in North America to 35 per million in Uganda,” says Lauren A. Dalvin, M.D., ocular oncologist with Ophthalmology at Mayo Clinic in Rochester, Minnesota. “And although there have been several large series examining conjunctival lesions in the United States, the reports are primarily from tertiary care centers, making them subject to referral bias.”

Using data from the Rochester Epidemiology Project, which captures more than 50 years of medical records from nearly all (148,201) residents of Olmsted County, Minnesota, Dr. Dalvin and a research team conducted a retrospective U.S. population-based study of conjunctival lesions. Results were published in the British Journal of Ophthalmology in 2018.

The research team searched the Rochester Epidemiology Project database to identify patients with conjunctival tumors in Olmsted County from Jan. 1, 1980, to Dec. 30, 2015, using unique codes from three sources:
- 25 Hospital International Classification of Diseases Adapted codes
- 24 International Classification of Diseases (ICD)-10 codes
- Eight ICD-9 codes

They then reviewed the records for demographics, types of tumors, histopathology, treatment and clinical course.

“Patients were only included if diagnoses were made or confirmed by an ophthalmologist or optometrist, and if they represented benign or malignant tumors,” says Dr. Dalvin. “Because our initial search criteria were broad, we reviewed all cases to ensure all tumors were included while excluding degenerative lesions, conjunctivitis, cysts, phlyctenules, pingueculae, pterygia, granulomata and depositions.

“Lesions were then divided into benign and malignant. While benign melanocytic lesions, such as primary acquired melanosis, can transform into malignant melanoma, these lesions were classified as benign and followed for transformation into melanoma during the study period. Malignant tumors were categorized as melanocytic (malignant melanoma), premalignant and malignant epithelial OSSN, lymphoma or Langerhans cell histiocytosis.”

More than 3,300 patients in Olmsted County were diagnosed with a conjunctival lesion in the study period. Medical record review confirmed the presence of a conjunctival lesion in 919 patients. Exclusions yielded 504 patients with conjunctival tumor.

Of those 504 patients, 248 (49%) were male; 383 (76%) were white, 50 (10%) were Asian,
Use of Intraocular Lenses Relatively Safe for Treatment of Cataracts in Infants Ages 7 to 24 Months Old

Primary insertion of an intraocular lens during pediatric cataract surgery is the standard of care for children age 2 years and older. Although intraocular lens implantation has become more common in patients younger than 2 years, concerns about adverse events, re-operations and refractive changes continue to be serious considerations in infants.

To evaluate these concerns, Erick D. Bothun, M.D., and a research team with Ophthalmology at Mayo Clinic in Rochester, Minnesota, conducted a retrospective review of infants ages 7 to 24 months treated by surgeons at 10 Infant Aphakia Treatment Study (IATS) sites during that study’s enrollment period.

“The IATS assessed the outcomes and complications of unilateral cataract surgery in infants ages 1 to 7 months,” says Dr. Bothun. “This study, the Toddler Aphakia and Pseudophakia Study (TAPS), is a retrospective consecutive case series of cataract surgery procedures performed in infants ages 7 to 24 months by surgeons who simultaneously were enrolling younger babies in the IATS.

“Because the surgical and clinical care of the TAPS mirrored that of the IATS, the outcomes of surgery for children ages 7 to 24 months in the TAPS can be compared with those reported for children ages 1 to 7 months in IATS.”

The IATS five-year results from the Infant Aphakia Treatment Study Group appeared in *JAMA Ophthalmology* in 2014. The first TAPS cohort results were published in *Ophthalmology* in 2019.

Infants were eligible for inclusion in the TAPS registry if they had undergone unilateral or bilateral cataract surgery performed by an IATS surgeon prior to age 24 months during the IATS enrollment period (Jan. 1, 2004, through Dec. 31, 2010). This first manuscript from the TAPS registry involved only the infants with unilateral cataract, and for this effort, the TAPS exclusion criteria largely paralleled the IATS criteria.

The 10 IATS sites registered 96 infants ages 7 to 24 months with a history of unilateral cataract surgery between 2004 and 2010. Ultimately, 56 infants were included in the unilateral TAPS.

Surgery was performed on the right eye in 31 infants (55%) and on the left eye in 25 infants (45%). A primary intraocular lens was inserted in 51 infants (91%). Intraocular lenses were implanted in 20 of 24 infants (83%) who were 7 to 12 months of age, and in 31 of 32 infants (97%) who were 13 to 24 months of age.
Clinical and surgical records were reviewed for visual acuity, refractive correction, patching compliance, intraocular pressure, ocular motility, and anterior segment and ocular fundus examination findings until the final study visit, when the infants were between 4 and 6 years of age. Other patient details included gender, age at surgery, cataract description, strabismus measurements and intraocular lens power.

Main outcome measures
Intraoperative complications and adverse events were recorded using the IATS criteria. Intraoperative complications occurred in four infants (7%). An additional unplanned intraocular surgery occurred in 14% of infants. Adverse events were identified in 24%, with a 4% incidence of glaucoma suspect. Strabismus surgery was performed in 40% of the infants with strabismus before 4 years of age.

Visual acuity, strabismus, stereopsis and glaucoma outcomes were not statistically different between the study groups. Neither adverse events nor intraocular re-operations were more common for infants with surgery at 7 to 12 months of age than for those who underwent surgery at 13 to 24 months of age.

“Although most infants in TAPS between 7 months and 2 years of age underwent intraocular lens implantation concurrent with unilateral cataract removal, the incidences of complications, re-operations and glaucoma appear much lower than when intraocular lenses were used by the same surgeons in infants younger than 7 months of age in the IATS,” says Dr. Bothun. For infants who received an intraocular lens in IATS, intraoperative complications occurred in 28%, adverse events in 81%, and additional intraocular surgeries in 72%.

“Due to inflammatory risks, structural challenges and characteristics of eye growth, the IATS and other efforts showed that cataract surgery risks increase in infancy compared with older children and teenage youth. Prior to the TAPS, the literature has lacked documentation regarding cataract surgery outcomes in infants just older than the IATS group. The TAPS findings support the relatively safe use of intraocular lenses in infants between 7 and 24 months of age,” says Dr. Bothun.

For more information


Study Supports Increased Risk of Ischemic Stroke in the Peri-CRAO Period

To determine whether findings seen in international studies are applicable to a U.S. cohort, John J. Chen, M.D., Ph.D., and a research team with Ophthalmology at Mayo Clinic in Rochester, Minnesota, evaluated the risk of stroke after central retinal artery occlusion (CRAO) in patients at Mayo Clinic.

Occlusion of the central retinal artery and its branches that perfuse the inner retina can produce acute vision loss in the affected eye (Figure). The incidence of CRAO has been estimated at 1 to 2 per 100,000 people a year, and 80% of patients with CRAO have profound vision loss with a final visual acuity of 20/400 or worse.

In addition to debilitating vision loss, however, studies from Taiwan and Korea, published in the *American Journal of Ophthalmology* in 2012 and *Ophthalmology* in 2015, respectively, suggest that retinal artery occlusions are associated with an increased risk of ischemic stroke. “Since these articles were published, content experts have proposed that retinal artery occlusions are an emergency and recommend cerebrovascular evaluation within 24 hours,” says Dr. Chen. “Our goal was to provide evidence from the U.S. to help guide the discussion on how quickly a comprehensive cerebrovascular evaluation and work-up should take place in patients with CRAO.”

Study results were published in *Mayo Clinic Proceedings* in 2019.

Researchers reviewed charts for patients older than 18 years with a confirmed new diagnosis of CRAO from Jan. 1, 2001, through Sept. 9, 2016, at Mayo Clinic sites in Rochester, Minnesota; Jacksonville, Florida; and Phoenix/Scottsdale, Arizona. Information gathered included:

- Patient sex
- CRAO laterality

John J. Chen, M.D., Ph.D.
• Patient age at the time of diagnosis
• Cause of CRAO
• Ischemic stroke within 15 days before or after CRAO
• Transient ischemic attack (TIA) within 15 days before or after CRAO
• Amaurosis fugax within 15 days before or after CRAO

“We took care to determine the time course of stroke and CRAO, including noting when stroke and CRAO occurred on the same day,” says Dr. Chen. “Peri-CRAO stroke included stroke within 15 days before CRAO, simultaneously with CRAO, or 15 days after CRAO. In patients whose work-up included MRI, we recorded asymptomatic diffusion restriction, indicating clinically silent cerebral ischemia. Evidence of old or chronic cerebral ischemia on MRI was also noted.”

Ultimately, 300 patients with CRAO were included in the study cohort. The median age at the time of CRAO was 72 years, and 158 of the patients were male. Overall, 16 patients (5.3%) had symptomatic ischemic stroke around the time of CRAO, with seven strokes (2.3%) occurring 15 days before CRAO, four (1.3%) occurring simultaneously with CRAO, and five (1.7%) occurring after CRAO.

In addition, 25 of 110 patients (22.7%) had either symptomatic stroke or asymptomatic diffusion restriction among patients who underwent MRI around the time of CRAO, which further highlights the connection between CRAO and stroke.

Dr. Chen notes: “The two most common causes of CRAO were embolic and unknown, with thrombotic, vasculitic, surgical complications and central retinal vein occlusion-induced CRAO each causing a smaller number of CRAOs. Of the patients with embolic CRAO, 7% had a peri-CRAO stroke compared with 1.3% of patients with an unknown cause of CRAO. The overall peri-CRAO stroke risk was similar to that of previous international reports on the risk of stroke and CRAO.”

In 2017, research published in *Ophthalmology Retina* retrospectively reviewed a cohort of patients with CRAO in the U.S. and found a 7% risk of TIA or stroke before or after CRAO, with 1% occurring within three months after CRAO. “In conjunction with these studies, our study supports that there is a clear increased risk of stroke around the time of CRAO, especially if an embolic etiology of CRAO is diagnosed,” says Dr. Chen. “This study provides further evidence of the increased risk of ischemic stroke, including asymptomatic cerebral infarctions, in the peri-CRAO period. Therefore, if a patient is diagnosed with an acute CRAO, an urgent cerebrovascular work-up is required, with an emphasis on carotid imaging.”

For more information

