In 1999, an Institute of Medicine report estimated that as many as 100,000 deaths potentially occurred each year in hospitals because of medical errors. In a 2001 JAMA article, Rodney A. Hayward, M.D., and Timothy P. Hofer, M.D., M.S., found that up to 23 percent of patient deaths were preventable with optimal care.

Today, “patient safety focused on a reduction in both procedural and diagnostic errors is the No. 1 concern of the U.S. health care system,” says George B. Bartley, M.D., an ophthalmologist at Mayo Clinic’s campus in Rochester, Minnesota. “In ophthalmology, a culture of safety aims to minimize medical errors and harm to patients while providing care of the highest quality — as well as working to ensure the safety of the eye care team.”

Dr. Bartley and a team of peers presented their 2016 study, Building a Culture of Safety in Ophthalmology, at the American Board of Ophthalmology 100th Anniversary Symposium. The study also was published in a special supplemental issue of Ophthalmology.

“In the past decade, there has been a tremendous focus on patient safety and building health care delivery systems that make errors less likely to occur,” says Dr. Bartley. “There has been a paradigm shift in health care: from personal responsibility to teamwork and shared responsibility, from individual care preferences to standardized systematic care processes, from culpability and punitive responses to open reporting and a just culture, and from the idea that people fail to the approach that systems fail and that those systems can be re-engineered successfully. The synergy between patient safety and occupational safety in hospitals, in particular, has been noteworthy.”

Patient safety issues
Dr. Bartley notes: “Diagnostic error may be both the most important and most challenging safety issue in medicine today. Wrong diagnosis, delayed diagnosis and failure to communicate diagnostic results lead to patient harm and are the most frequent cause and greatest cost of malpractice claims.

“Wrong surgery, and in particular wrong intraocular lens insertion, is arguably the most visible patient safety issue in ophthalmology. These mishaps are preventable and their persistence has gained the attention of state and federal entities. Wrong surgery is not isolated to cataract extraction, however. Nearly 34 percent of pediatric ophthalmologists report being involved in a wrong patient, wrong eye or wrong procedure incident during their careers.

“Patients can be exposed to other injuries, too, such as toxic anterior segment syndrome, endophthalmitis resulting from contaminated compounded drugs, or thermal injury. Communication errors are a frequent cause of patient safety mishaps, and outpatient prescription mistakes are not uncommon. Undetected drug side effects are a serious safety issue, as is incorrect preoperative management of anticoagulants.”

Culture of workplace safety
A culture of safety in medicine has defined elements that decrease the rates of error and patient harm within work teams, including:

• Acknowledgment of the high-risk nature of the team’s activities and a commitment to consistently safe operations
Among all cases of ocular misalignment from cranial nerve palsies, third nerve palsies are the most worrisome, because a subset of these cases is caused by life-threatening aneurysms. There is significant disagreement, however, regarding the true incidence of third nerve palsies and the relative incidence of the various etiologies. Studies conducted in the U.S. have not been population-based, and therefore may suffer from referral bias toward more severe disease.

John J. Chen, M.D., Ph.D., Chengbo Fang, M.D., David O. Hodge, Jonathan M. Holmes, M.D., Jacqueline A. Leavitt, M.D., and Brian G. Mohney, M.D., at Mayo Clinic’s campuses in Rochester, Minnesota, and Jacksonville, Florida, turned to the Rochester Epidemiology Project database to help determine the population-based incidence and etiologies of acquired third nerve palsies. Their study was published in *JAMA Ophthalmology* in 2017.

The researchers searched the REP records for a diagnosis of third nerve palsy and reviewed those records to confirm the diagnosis. In confirmed cases, the cause of the third nerve palsy was determined. The researchers also documented details of the acquired third nerve palsy at presentation, including age, imaging that was performed, pupil involvement, ptosis, degree of ophthalmoplegia, presence of eye pain or headache, other neurological symptoms, recovery, and aberrant regeneration.

In all, the researchers identified 145 newly diagnosed cases of acquired third nerve palsy that occurred over a 37-year period in Olmsted County, Minnesota. The age- and sex-adjusted annual incidence of acquired third nerve palsy was 4 cases per 100,000. The annual incidence in patients older than 60 was greater than patients younger than 60, predominantly due to a large increase in microvascular third nerve palsies in older adults.

The most common causes of acquired third nerve palsy were presumed microvascular (42 percent), trauma (12 percent), compression...
Medically and Surgically Treated Glaucoma

Diplopia Underrecognized in Patients With posterior communicating artery aneurysm pupil involvement. All three patients with aneurysmal compressive third nerve palsies had pupil involvement at presentation, while 81 percent of nonaneurysmal third nerve palsies had pupil involvement at presentation. Pupil involvement was seen in:

- 33 percent of aneurysms
- 64 percent of microvascular third nerve palsies
- 16 percent of compressive third nerve palsies

Among compressive third nerve palsies, 33 percent of aneurysms had pupil involvement at presentation, while 81 percent of nonaneurysmal compressive third nerve palsies had pupil involvement. All three patients with posterior communicating artery aneurysm presented with pupil involvement, while all five patients with intracavernous sinus aneurysm initially presented with pupil-sparing third nerve palsies but then developed pupil involvement over time.

“The study provides a population-based incidence and etiologies of acquired third nerve palsy, which have demonstrated a higher incidence of microvascular and a lower incidence of aneurysmal third nerve palsies than previously reported. This likely reflects the true etiologic incidences because it was a population-based study and therefore does not suffer from inherent referral bias,” says Dr. Chen. “The incidence upsurges in the sixth decade of life associated with an increase in microvascular third nerve palsies. And while pupil involvement was more common in compressive lesions, pupil involvement was seen in some cases of microvascular third nerve palsies, and pupil sparing was seen in some cases of compressive lesions, including aneurysm.”

For more information

Diplopia Underrecognized in Patients With Medically and Surgically Treated Glaucoma

A study of 195 adult patients who received medical or surgical treatment for glaucoma indicates that diplopia may be underrecognized in those patients — and standardized use of the diplopia questionnaire (Figure, page 4) to ascertain patient symptoms may be helpful.

Cheryl L. Khanna, M.D., Jonathan M. Holmes, M.D., David A. Leske, M.S., and Philip Y. Sun, M.S., at Mayo Clinic’s campus in Rochester, Minnesota, conducted the cohort study to identify the prevalence, type and etiology of diplopia in patients with glaucoma who were treated medically and surgically. “Diplopia has been reported as a complication of glaucoma treatment, but has not been rigorously studied across the spectrum of medical and surgical treatment for glaucoma. Nor has it been assessed prospectively with an instrument specifically designed to assess diplopia,” says Dr. Khanna. Study results were published in Ophthalmology in 2016.

All patients in the cohort completed the diplopia questionnaire, a patient-reported outcome measure to assess symptoms of diplopia in specific gaze positions. In this study, the researchers defined the presence of diplopia as the patient indicating diplopia with a frequency of sometimes, often or always when looking straight ahead in the distance or when reading or when doing both on the diplopia questionnaire. Diplopia was reported in 41 patients (21 percent) in the cohort.

Dr. Khanna, a glaucoma specialist, and Dr. Holmes, a strabismus specialist, determined the type and etiology of diplopia by joint review of the entire medical record with specific attention to the characteristics and the time course of diplopia and strabismus. Results indicate:

- Binocular diplopia attributable to the glaucoma procedure was present in 11 of 47 (23 percent) patients after glaucoma drainage device (GDD) surgery (95 percent confidence index, or CI; 12 to 38 percent), which was significantly greater than in patients post trabeculectomy (two of 61, or 3 percent, 95 percent CI; 0.4 to 11 percent; P = 0.002).
• The most common type of strabismus associated with binocular diplopia attributable to glaucoma surgery was hypertropia: 10 out of 11 patients who received GDD surgery and two out of two patients who received trabeculectomy.

• Monocular diplopia was found in a similar proportion of patients who received medical treatment, were post-trabeculectomy and were post-GDD surgery: Four of 87 (5 percent), four of 61 (7 percent), and two of 47 (4 percent) respectively.

• Binocular diplopia not attributable to surgery was found in similar proportions of patients who received GDD surgery, trabeculectomy and medical treatment: Three of 47 (6 percent), five of 61 (8 percent), and 10 of 87 (11 percent) respectively.

Diplopia occurred in 16 percent of the control group (patients treated medically for glaucoma), which reflects the occurrence of common strabismus conditions (convergence insufficiency, adult-onset distance esotropia and small-angle hypertropia) in this population of mostly older adults.

“Diplopia was more commonly seen in patients after GDD surgery, and specifically in patients who received Baerveldt BG 101-350, rather than patients who received trabeculectomy. Diplopia is more common in patients with multiple and bilateral GDD surgery. The prevalence of monocular diplopia and binocular diplopia unrelated to glaucoma surgery was similar among medical and surgical groups,” says Dr. Khanna. “That outcome indicates that it is important to counsel patients on the higher occurrence of diplopia associated with GDD surgery.

“The diplopia questionnaire is valuable for use in studies reporting diplopia and strabismus. Use of this standardized tool to assess diplopia may be helpful in the routine care in patients with glaucoma. It may also be helpful for patients undergoing glaucoma surgery to have a standardized assessment of diplopia and strabismus, both before and after surgery. Without a standard instrument, providers may not broach the topic of diplopia with patients in routine follow-up appointments and as a result, diplopia may not be reported consistently in the medical record.”

For more information