Conclusions: Stepped strabismus surgery is a useful technique for borderline cases with the potential for reducing the number of extra ocular muscles operated on without compromising the surgical outcome.

019   Incidence of symptomatic torsional and vertical diplopia after superior rectus transposition for esotropic duane syndrome and 6th nerve palsy. Anna G. Escuder, Melanie A. Kazlas, Gena Heidary, David G. Hunter, Linda R. Dagi

Introduction: To describe the incidence of symptomatic vertical and torsional strabismus after superior rectus transposition (SRT) for esotropic Duane syndrome (DS) and 6th nerve palsy.

Methods: Retrospective chart review of pre- and postoperative sensorimotor exams on patients with 6th nerve palsy or esotropic DS treated with SRT with or without medial rectus recession (2000-2018). Patients with bilateral SRT, or treatment with additional rectus or oblique surgery were excluded.

Results: 66 patients met inclusion criteria, including 32 patients with sixth nerve palsy and 34 patients with DS. Average follow up was 2.4 years and age at surgery, 22.8 years. Average preoperative esotropia was 42^Δ (95% CI, 38.5- 46.2) and postoperative was 10.2^Δ (95% CI, 7.76-12.7). Average pre- and postoperative vertical deviation in primary gaze was 1.78^Δ (95% CI, 0.95-2.62) and 2.62^Δ (95% CI, 1.48-3.63), respectively. Abduction enhancement was performed with SR-LR loop myopexy in 47 and scleral-fixated myopexy in 7 patients. Symptomatic vertical diplopia occurred in 4 of 47 treated with loop myopexy and in 1 of 7 with scleral-fixated. None of the 66 patients developed symptomatic torsion.

Discussion: Superior rectus transposition has been advocated as an alternative to balanced vertical rectus transposition. In this largest-to-date retrospective review, 7.5% of patients developed symptomatic vertical diplopia and none developed symptomatic torsional diplopia.

Conclusions: Superior rectus transposition with or without medial rectus recession provides a muscle-sparing alternative to balanced vertical rectus transposition with similar rates of induced vertical and torsional diplopia.

020   Home tonometry redefines glaucoma drainage device management in childhood glaucoma. Michelle S. Go, Navajyoti R. Barman, Robert J. House, Sharon F. Freedman

Introduction: The postoperative management of the nonvalved Baerveldt glaucoma drainage device (GDD) presents challenges in children due to widely variable intraocular pressure (IOP) often occurring perioperatively. We evaluated the use of home tonometry in the management of Baerveldt GDDs for refractory childhood glaucoma.

Methods: As part of an ongoing prospective study involving home rebound tonometry, the families of patients receiving Baerveldt GDDs were trained to use the Icare® rebound tonometer (Ta01,Finland,Oy) and asked to document IOP, relevant symptoms, and medication changes onto a web-based data application or Excel spreadsheet. Data were analyzed for time to tube opening, multiple-day fluctuations, and various IOP trends. Clinician response to IOP fluctuations detected by home tonometry was also evaluated.

Results: Included were 19 patients (mean age, 16.1 ± 9.6 years) having Baerveldt implantation from 2015-2018 by one attending. Home tonometry detected 100% (12/12) of spontaneous tube openings, which occurred at 6.0 ± 0.5 weeks. Mean IOP decreased 32.8% (25.1 vs 16.9 mm Hg; $P < 0.01$) and 5-day IOP fluctuation decreased

from 14.5 to 6.2 mm Hg ($P < 0.05$) after tube opening. Preoperative, post-implantation, and post-opening IOP range was 11-59, 3-61, and 1-50 mm Hg, respectively. Home tonometry corroborated clinical hypotony in 5 eyes and early hypertensive phase in 9. It prompted 75 documented medication changes among 14 patients.

Discussion: Home rebound tonometry accurately detected tube opening and alarming IOP fluctuations, allowing clinicians to promptly and appropriately respond to these events.

Conclusions: Home tonometry-augmented GDD management in childhood glaucoma may improve care of these challenging patients.

021   High prevalence of sagging eye syndrome in adults with binocular diplopia. Toshiaki T. Goseki, Suh Soh Youn, Laura Robbins, Stacy L. Pineles, Federico G. Velez, Joseph L. Demer

Introduction: Sagging eye syndrome (SES), horizontal and/or vertical strabismus caused by orbital connective tissue degeneration, was first defined 10 years ago. While SES is increasingly recognized as a cause of acquired diplopia, its prevalence is unknown. We investigated SES prevalence in diplopic adults.

Methods: We reviewed all new adults over age 40 years, presenting to the UCLA strabismus division with binocular diplopia between August 2017 and September 2018. Age, gender, and type of strabismus were analyzed.

Results: We reviewed 208 total patients of mean ± SD age 67 ± 11 (range, 40-91) years of whom 113 (54%) were female. The most common cause of diplopia was SES (28.8%), followed by exotropia (10.1%), thyroid ophthalmopathy (8.2%), trochlear palsy (8.2%), abducens palsy (7.7%), decompensated esophoria (4.8%), orbital trauma (3.4%), scleral buckling (2.9%), and skew deviation (2.4%). The 63 patients with SES were older at 71 ± 9 years (range, 52-91 years, $P < 0.0001$) and more predominantly female at 63% than other patients (49%, $P = 0.02$). SES caused 15% of all diplopia in patients from ages 50-59 years, 33% from ages 60-69 years, 37% from ages 70-79 years, and 33% over age 79 years, but no diplopia under age 50 years.

Discussion: SES is the most common cause of acquired binocular diplopia in adults over 50 years old, comprising about 30% of all cases, easily surpassing cranial neuropathies and thyroid eye disease. However, SES was not encountered in patients under age 50 years.

Conclusions: It is important to recognize that SES is a very common cause of adult binocular diplopia.

022   Deep learning for monitoring rop progression. Kishan Gupta, Stanford Taylor, J. Peter Campbell, Jayashree Kalpathy-Cramer, James M. Brown, R. V. Paul Chan, Sang J. Kim, Michael F. Chiang

Introduction: To evaluate the clinical utility of quantitative image analysis using a deep learning plus disease severity score to monitor disease progression and response to treatment in patients with retinopathy of prematurity (ROP).

Methods: Images from clinical exams performed between July 2011 and December 2016 of infants in the multicenter Imaging and Informatics in ROP study were reviewed to identify babies with treatment-requiring disease, and scored by an automated deep learning algorithm with from 1 (normal retinal vasculature) to 9 (severe plus disease). Severity scores for treated and untreated eyes were compared longitudinally. The 4-week pre- and post-treatment scores with either laser or anti-vascular endothelial growth factor (anti-VEGF) were assessed.

Results: A total of 1692 eyes were analyzed. 91 eyes progressed to treatment-requiring disease. Mean severity scores of the two groups