Abstracts

Edited by Dr. Tahir Mahmood

The association between thyroid problems and glaucoma

Cross JM, Girkin CA, Owsley C, McGwin Jr G
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Primary open angle (OAC) glaucoma is a leading cause of vision impairment and blindness in the United States and worldwide. The incidence of glaucoma increases with age, and it is higher among African-Americans than most other racial and ethnic groups. As a broad category, thyroid condition may potentially have an effect on the development of glaucoma. Several case reports and case series have found an association with hypothyroidism, and a recent population-based study found that glaucoma was more common among thyroxine users and those with a history of thyroid surgery. However, that study comprised Australians largely of European ancestry, thus limiting the generalizability of the results. Other studies, however, have failed to find any significant association between hypothyroidism and glaucoma. Thus, there is a lack of consistent epidemiological evidence on associations between hypothyroidism and glaucoma. Additionally, though considerably less common, significant relationships have been demonstrated between thyroid-associated orbitopathy (Graves orbitopathy/ophthalmology) with open-angle glaucoma, ocular hypertension (OHT), and dysthyroid optic neuropathy (DON).

Glaucoma is characterised by progressive optic nerve damage, resulting in the death of retinal ganglion cells, which ultimately impedes the transmission of visual impulses from the eye to the brain. Although elevated intraocular pressure (lOP) is a primary risk factor glaucomatous injury may occur at normal lOP. There are a number of purported mechanisms by which thyroid disorders and their treatment are believed to affect the development of glaucomatous damage. In Graves disease, lOP may be raised as a result of contraction of the extraocular muscles against intraorbital adhesions or orbital congestion due to increased tissue volumes. In the case of hypothyroidism, excessive mucopolysaccharide accumulation within the trabecular meshwork acts like a surfactant, sticking together adjacent endothelial membranes.

The purpose of this study was to evaluate the association between thyroid problems and glaucoma.

A population-based cross-sectional sample with 12,376 participants from the 2002 National Health Interview Survey. Odds ratios (OR) and 95% confidence intervals (Cls) were used to quantify the association between a self-reported diagnosis of glaucoma and a self-reported history of thyroid problems, controlling for demographic characteristics and smoking status.

The overall prevalence of glaucoma was 4.6%; 11.9% reported a history of thyroid problems. The prevalence of glaucoma among those who did and did not report thyroid problems was 6.5% and 4.4%, respectively (p = 0.0003). Following adjustment for differences in age, gender, race and smoking status, the association between glaucoma and thyroid problems remained (OR 1.38, 95% Cl 1.08 to 1.76).

Authors concluded with the remarks that the results of this study lend support to the hypothesis that thyroid disorders may increase the risk of glaucoma. Research should continue evaluating potential mechanisms underlying this relationship and whether the treatment of thyroid problems reduces subsequent glaucoma risk.

Hydroxychloroquine retinopathy screening

Semmer AE, Lee MS, Harrison AH, Olsen TW
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Since the 1950s, antimalarial drugs have been used to treat various autoimmune diseases including systemic lupus erythematosus and rheumatoid arthritis. In the United States, hydroxychloroquine is the antimalarial drug of choice because of its low retinal toxicity. Between 1960 and 2005, only 47 cases of hydroxyl-chloroquine retinopathy have been reported in the peer-reviewed literature. Despite the existence of

unreported cases, hydroxychloroquine retinopathy is rare. The exact pathophysiology remains unknown, but daily dose, duration of therapy, renal function; liver function and patient age modify patient risk.

The ophthalmology and rheumatology literature continually debate the most appropriate paradigm for hydroxychloroquine retinopathy screening. In 2002, the American Academy of Ophthalmology (AAO) addressed this controversy by publishing preferred practice patterns (PPP) for hydroxychloroquine retinopathy screening. These evidence-based guide-lines attempted to maximise practicality and optimise the cost/benefit ratio of hydroxychloroquine retinopathy screening. They were designed as guidelines that physicians might choose to modify based on their clinical judgement, patient preference and medicolegal concerns.

The PPP recommends baseline examination and risk assessment within the first year of therapy. There is no need for follow-up in the first 5 years for low-risk patients; however, the PPP recommend annual screening of high-risk patients. High-risk patients are those with: (1) daily hydroxychloroquine exceeding 6.5 mg/kg, (2) duration of therapy greater than 5 years, (3) age greater than 60, (4) obesity, (5) renal disease, (6) hepatic disease or (7) concurrent retinal disease.

The PPP hydroxychloroquine retinopathy screening exams include a comprehensive ophthalmological evaluation with central visual-field assessment by either Amsler grid or Humphrey Visual Field (HVF) 10-2 perimetry (Zeiss, Dublin, CA). Colour vision testing, fundus photography, fluorescein angiography and multifocal electroretinography (mfERG) are considered optional.

This investigation compared the current hydroxylchloroquine screening practices of community ophthalmologists to the guidelines outlined in the PPP. Knowledge of risk factors and recommended follow-up frequencies were assessed along with the financial implications of current screening methods.

The purpose of this study was to compare current hydroxychloroquine retinopathy screening practices with the published 2002 American Academy of Ophthalmology (MO) Preferred Practice Patterns (PPP).

A multiple-choice survey was distributed to 105 ophthalmologists to assess current screening practices and knowledge of patient risk factors, Results were compared with the PPP guidelines. A cost analysis of the PPP and survey paradigms was conducted.

Sixty-seven (64%) of 105 surveys were completed. The majority (90%) of physicians screen for hydroxychloroquine retinopathy with either central automated threshold perimetry or Amsler grid as recommended by the PPP. Most survey respondents could not correctly identify the evidence-based risk factors. The majority screen more frequently than recommended: 87% screen high-risk patients and 94% screen low-risk patients more frequently than recommended in the PPP. The increased screening frequency of low-risk patients translates into an excess of $44 million in the first 5 years of therapy. If all patients were screened using exact PPP paradigm, savings could exceed $150 million every 10 years.

Authors concluded with the remarks that the ophthalmologists currently screen for hydroxychloroquine retinopathy correctly; however, their lack of familiarity with evidence-based guidelines may result in excessive follow-up. Increasing awareness and implementation of the PPP could potentially reduce hydroxychloroquine retinopathy screening costs significantly.

Apodized diffractive versus refractive multifocal intraocular lenses: Optical and visual evaluation

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Advances in intraocular lens (IOL) design have significantly improved the visual outcomes of cataract surgery. Multifocal IOLs are designed to reduce dependence on eyeglasses after cataract surgery, and IOLs are gaining acceptance as potential refractive surgical options in selected patients.

Monofocal IOLs provide excellent visual function; however, their limited depth-of-focus means that for many patients, they do not provide clear vision at both distance and near. Patients with traditional monofocal IOLs usually require glasses for near tasks such as reading. Monovision techniques may be helpful for some patients but can sacrifice binocularity.

Introduction of the multifocal IOL in the early 1980s provided the potential for a range of uncorrected vision from near to far. Providing distance and near vision increases the depth of field and improves visual quality at near, visual quality that

improves with time. Multifocality is the brain's natural ability to adapt to near and far vision as it chooses, based on the object being viewed, between the 2 images (near and far) produced by the optical elements of the IOL. These simultaneous-vision IOLs provide distance, intermediate, and near correction within the area of the eye's pupil. When a person is viewing a distant object, a sharp retinal image is provided by the parts of the IOL within the papillary area that have the distance correction; a somewhat blurred image is provided by the other parts of the IOL as the images are superimposed on the retina. The decrease in contrast of the in-focus image is produced by the split of the total light energy between the far and near focus, while the simultaneous presence (superimposition) on the retinal of the in-focus image and out-of-focus image can produce as sort of retinal rivalry or confusion; however, this is overcome by the brain's capability to use multifocality. Multifocality theoretically implies that more stray light reaches the retina. However, psychometric measures show that perceived stray light is not different in eyes with monofocal IOLs, thus the importance of brain adaptation.

The purpose of this study was to evaluate the optical and visual performance after implantation of refractive or apodized diffractive multifocal intra-ocular lenses (IOLs).

Uncorrected distance visual acuity, best distance-corrected visual acuity, best distance-corrected near visual acuity, distance contrast sensitivity under photopic conditions (CSV-1000), residual refractive error, and wavefront aberrations (LAOARWave Hartmann-Shack wavefront analyzer) were measured in 23 patients who had bilateral implantation of the AcrySof ReSTOR SN60D3 IOL and 23 patients who had bilateral implantation of the ReZoom IOL.

At the 6-month postoperative visit, the mean photopic uncorrected distance acuity was 0.03 ± 0.05 (SD) in the ReSTOR group and 0.02 ± 0.06 logMAR in the ReZoom group (both approximately 20/20) (P = .569). In all patients, the mean photopic best distance-corrected acuity was 0.00 logMAR (approximately 20/20) and the mean photopic best distance-corrected near acuity at 35 cm was 0.10 logMAR. The photopic contrast sensitivity was within the standard normal range in both IOL groups. The difference in photopic contrast sensitivity between groups was statistically significant (P<.001). Higher-order aberrations, in particular coma and spherical aberrations, were significantly higher in the ReZoom group (all P<.001).

Authors concluded with the remarks that the AcrySof ReSTOR SN60D3 and ReZoom IOLs provided good visual performance at distance and near under photopic conditions. Optical Quality measures were significantly worse in patients with ReZoom IOLs.

Contrast sensitivity after refractive lens exchange with diffractive multifocal intraocular lens implantation in hyperopic eyes

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Multifocal intraocular lenses (IOLs), in which multiple focal lengths are present within the optical zone, were designed to provide good uncorrected distance and near vision. They are available with diffractive optics or with zones of differing refractive power. These simultaneous-vision IOLs provide distance, inter-mediate, and near correction within the area of the ocular pupil. For distance vision, the parts of the IOL that have the distance correction within the papillary area produce a sharp retinal image. Other parts of the IOL produced more blurred images that are superimposed on the retina. The roles of the corrections change when a near object is observed; in this case, the areas of the IOL that have the near correction provide the correctly focused retinal image. In both situations, the unwanted effect of light in the out-of-focus image is to reduce the contrast of the in-focus image. New optical designs applied to pseudoaccommodating IOLs combine refractive and diffractive optics to reduce the disadvantages of conventional refractive and diffractive IOLs in terms of contrast reduction.

Visual evaluation of the AcrySof ReSTOR IOL (Alcon Laboratories) has been performed in detail, and several large studies indicate that the quality of vision with the IOL is good. The key question is whether the optical tradeoff inherent in a multifocal IOL results in better or worse visual function than that with the natural lens. A recent study by Montes-Mico et al. found that aberration levels after implantation of the AcrySof ReSTOR IOL in patients having refractive lens exchange (RLE) appear to be similar to those in the authors report that this IOL yielded good photopic high-contrast, distance, and near visual acuity,

although intermediate vision was slightly impaired, as was vision of low-contrast objects.

The purpose of this study was to evaluate distance and near contrast sensitivity under photopic and mesopic conditions before and after refractive lens exchange (RLE) with implantation of a diffractive multifocal intraocular lens (IOL).

Monocular contrast sensitivity function was measured with the Functional Acuity Contrast Test chart at distance and near under 3 luminance levels (85.0 cd/m, 5.0 cd/m, and 2.5 cd/m) before and after RLE with bilateral AcrySof ReSTOR IOL implantation in 30 hyperopic eyes with presbyopia and low astigmatism (≤ 1.0 diopter). Results after surgery were compared with those before surgery.

Six months postoperatively, the mean residual spherical equivalent refractive error was 0.21 diopter ± 0.19 (SD). The best corrected distance and near visual acuities were comparable to those before surgery. For distance vision, the safety index was 1.02 and the efficacy index was 0.91. For near vision, the values were 1.04 and 1.02, respectively. There were no statistically significant differences between preoperative and postoperative results at any distance or spatial frequency or under any lighting condition ($P > .1$, t test).

Authors concluded with the remarks that the refractive lens exchange with implantation of a diffractive multifocal lOL gave good distance and near contrast sensitivity under photopic and mesopic conditions. Although mesopic contrast sensitivity was reduced at distance and near compared to that under photopic conditions, the performance was comparable to that with the natural lens preoperatively.

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