and colleagues showed that CPAP normalized IOP and restored blood pressure to a normal rhythm.11 CPAP in patients with OSAS and glaucoma may have a beneficial effect for the glaucoma as well as the OSAS.

It is important when taking a patient history to inquire about snoring and daytime somnolence. Often a patient’s spouse or partner can elucidate if he or she snores or describes moments when he or she stops breathing for a few seconds then resumes snoring. These symptoms are possible indications for OSAS and these patients should consider a formal polysomnography. If diagnosed with OSAS, the patient should seriously consider CPAP treatment to aid glaucoma treatment as well as improve their systemic status.

References

Practical Tips:
IOP assessment with the water drinking test

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Core concepts
• To identify both IOP-dependant and non IOP dependant factors is essential to understand why progression takes place in patients.
• We are currently unable to monitor 24 hour IOP continuously.
• Surrogate measures such as inter-visit IOP variation or diurnal IOP curves, although helpful, are sometimes impractical.
• An alternative to determine IOP fluctuation and peak IOP is the water-drinking test (WDT), which is simple to perform and evidence based.
• Peak WDT-induced IOP correlates well with peak diurnal IOP and may help to identify patients with fluctuating IOP peaks outside or even within routine office hours.
• The WDT requires the patient to drink a set volume of water within a short time period (usually 5 minutes).
• Due the diuretic effect of the WDT, care should be taken in individuals with cardiovascular or renal co-morbidities.
• Because of its poor sensitivity, the WDT is no longer acceptable as a provocative test to diagnose glaucoma.
• The WDT is a low cost, low tech practical alternative for cumbersome assessments of diurnal variations and peak IOPs and can highlight the need for further intervention or re-evaluation of current treatment plans.

Well-designed clinical trials provide strong evidence that elevated intraocular pressure (IOP) is a risk factor for the development of glaucoma and for progression of established disease. For example, pooled data from the Ocular Hypertension Treatment Study (OHTS) and European Glaucoma Progression Study (EGPS) suggests that for every 1mmHg higher baseline IOP, there is a relative risk of 1.09 for glaucoma development.1

IOP reduction is a proven strategy to prevent progression from ocular hypertension (OHT) to glaucoma or to slow the rate of glaucoma progression. However, patients with glaucoma progression despite IOP reduction remain a significant challenge. To identify both IOP-dependent and non IOP-depen-
dant factors is essential to understand why progression occurs in these patients. IOP-dependent factors are likely to include IOP fluctuation and peak IOP, both of which are associated with disease progression, both of which may be easily missed or underestimated with standard clinic based IOP measurements.\(^2\)

We are currently unable to monitor 24 hour IOP continuously and surrogate measures such as inter-visit IOP variation or diurnal /circadian IOP curves, although helpful, are sometimes impractical. An alternative to determine IOP fluctuation and peak IOP, which is both evidence-based and simple to perform, is the water-drinking test (WDT).\(^3\) It is essentially a “stress-test” which may lead to elevated IOP in some eyes due to yet to be determined mechanisms, which may include increased episcleral venous pressure, choroidal thickening or sympathetic excitation. The peak WDT-induced IOP correlates well with peak diurnal IOP and may help to identify individuals with fluctuating IOP peaks outside or even within routine office hours.\(^4\)

The WDT requires the patient to drink a volume of water in a short period, usually 5 minutes. Our preferred protocol is 10ml/kg body weight such that a 70 kg patient would drink 700mls; others have used a fixed volume such as 1 litre. Very occasionally, patients are intolerant of this volume of water but we find the addition of a small volume of fruit juice can help. Patients should be warned of the diuretic effect and care taken in individuals with congestive cardiac failure, renal impairment, hypotension or significant cardiovascular disease. IOP is measured every 15 minutes for 1 hour after the water is imbibed (figure 1). A modified WDT, where IOP is measured only 15 mins and 30 mins after consumption, may be adequate in the setting of significant time constraints given peak IOP typically occurs within this time period.\(^5\)

Results of a WDT can aid patient management in a number of ways:
- It facilitates discussion with the patient about reasons for progression
- It helps assess efficacy of current treatment
- It potentially allows treatment to be tailored if a high peak is identified. For example, prostaglandin analogues could be more suitable than beta-blockers for many patients or surgery more effective than medical treatment.

Because of poor sensitivity and specificity the WDT is no longer acceptable as a provocative test to diagnose glaucoma. However, it provides relevant information about the homeostatic mechanisms of *in vivo* aqueous dynamics for an eye and a patient: the extent of IOP increase and the speed with which it recovers. It is, therefore, a low cost, low tech, practical alternative for cumbersome assessments of diurnal variations and peak IOPs and can highlight the need for further intervention or re-evaluation of treatment plans. This is especially so in those who progress despite having achieved previously determined “target” pressures, as well as those with advanced glaucomatous damage.

References: