Papilledema secondary to ocular hypotony provides helpful insights on discriminating true from pseudo-optic nerve head swelling

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Abstract
Optic nerve head swelling can be a significant challenge in clinical practice when clinicians are required to differentiate true swelling (papilledema) from pseudo-papilledema (benign elevation of the optic nerve head). This case presentation describes a patient who experienced an ocular laceration that led to a vitreal prolapse and ocular hypotony. The ocular hypotony led to papilledema and retinal edema extending throughout the macular region of the right eye. The patient has been followed over a 2 year period with gradual improvement in visual acuity, visual field and various aspects of optical coherence tomography (OCT) measurements. The long-term follow up provides useful insights on the time-course of potential recovery, including the time course of reduction in retinal and optic nerve edema and identifies many useful and some pitfalls to be avoided when interpreting OCT imaging. Finally, an overview will be provided on discriminating true from pseudo-optic nerve head swelling using selected cases from the Centre for Eye Health.

I – Case History
A 28 year old female patient presented for an eye examination within two weeks after hospital discharge to repair a scleral laceration secondary to a knife injury to the right eye. She was complaining of visual disturbance OD and seeking an explanation for the cause of her visual disturbance and the timeline for recovery. She has been followed over 2 years.

II – Pertinent findings
Entering aided acuities were 20/25 OD and 20/20+ OS.
Ocular motility testing showed a full range of eye movements OU.
Evidence of the laceration included scleral sutures below the nasal conjunctiva extending over approximately 6-8mm length. A 10 day period of high systemic steroids did not improve vision in the right eye. No further treatment was recommended by the ophthalmology department.

Funduscopic and retinal photography revealed ONH and macular swelling OD. OCT scans revealed an edematous right ONH which has visibly reduced over the 2 year period (see below). Visual field assessment confirmed the improvement evident in the fundus photographs and reduced OCT thickness measurements. Intra-ocular pressure was within 2-3 mm Hg of the left eye within 6 weeks of surgery and has remained there over the 2 year follow up.

![ONH Image 27th Dec 2012](image)

![ONH Image 2nd Jan 2015](image)

![OCT Scan Dec 2012](image)
III – Differential diagnosis

Unilateral optic nerve head swelling\(^1\): can be caused by inflammatory, ischemic, infiltrative, direct optic nerve compression, trauma or through toxicity. In this case, ocular hypotony is the most likely cause.

IV – Diagnosis and discussion

Severe hypotony can lead to papilledema, choroidal folds resulting in choroid/retinal relationship compromise. The resultant retinal edema leads to visual disturbance experienced by this patient. One of the unique features in this case is the significant swelling of the retinal nerve fiber layer, which continues to improve over the 2 year period. Careful assessment of the OCT information comparing the two eyes provides additional information relating to the increased thickness which is masked if only the normative data are analysed. Although the optic nerve swelling in the acute phase is thought to be due to reduced axoplasmic flow\(^2\), the optic nerve continues to remain swollen 2 years after the initial injury. It is also possible to obtain corneal edema, choroidal detachment and cataract secondary to ocular hypotony.

Although the more common causes of hypotony are secondary to glaucoma surgery (trabeculectomy–leaking bleb), secondary to inflammatory disease (~8% uveitis) and secondary to intraocular infection, this case displays a wide spectrum of ocular changes associated with ocular hypotony.

V – Treatment, management

Management of ocular hypotony rests in identifying the underlying cause. Surgery was indicated and undertaken on the day of the laceration injury. Subsequent to that, a course of high systemic steroids was undertaken with no beneficial effect. In other causes of ocular hypotony, particularly secondary to bleb surgery or inflammation, managing the underlying cause is a major concern. In this case, providing timely information and likely prognosis, alleviated patient anxiety relating to return of her vision.

VI – Conclusion

Several cases of monocular and binocular ‘swollen’ optic nerves will be contrasted with this patient to highlight some similarities and significant differences to help clinicians differentiate the different types of disc swelling.