Case Report

A 47 year-old monocular woman is referred for management of uncontrolled glaucoma. Her right eye was lost following an unknown ophthalmic surgery during infancy. Visual acuity in the left eye is counting fingers at three meters, although her ambulatory ability is good. Marked horizonatal nystagmus is present. Slit lamp biomicroscopy demonstrates micropthalmos and the axial length measures 19 mm. The cornea is clear and there is an inferior iris coloboma extending to the choroid. The lens has been dislocated into the vitreous cavaity for 10 years. The IOP is 37 mmHg on fixed combination timolol-dorzolamide, latanoprost 0.005%, and brimonidine 0.15%. Central corneal thickness is 735 microns. The optic nerve head is small and anomalous with moderate pallor. Visual fields, photographs and images of the optic nerve are either impossible to obtain or unreliable.

Questions

1. What is the differential diagnosis of the ocular congenital malformation and raised IOP in this patient?
2. Is glaucoma present?
3. Describe your initial management of this patient. Assuming your initial interventions fail, how would you manage this patient for preservation of vision.

Gonioscopy

Nanophthalmos, B-scan for choroidal thickening, Axial length

Corneal thickness unusually thick (may be corneal dystrophy? fuch's)

Dislocated lens into vitreous 10 years: unlikely to cause phacolysis

OUR Comentes (Dr. Rajul Parikh, Dr. Ravi Thomas) :

1. Differential diagnosis of congenital abnormality and raised IOP in this patient: While the most probable and complete diagnosis would be colobomatous microphthalmos with posterior dislocation of the lens and secondary glaucoma (perhaps nanophthalmos), before we consider the differential diagnosis and cause of raised IOP, there are several questions that arise and information we need.

The projection of light may help in diagnosis and management. Inability to locate light in the temporal quadrants may raise diagnostic questions; especially in view of the reported pallor of the disc. An inaccurate projection with advanced glaucoma has management implications, which are discussed later.

The corneal thickness is mentioned as 735 μ. Measuring the corneal thickness in the presence of nystagmus is difficult; repeat measurements would be desirable. Either way, my cornea colleagues tell me that anything over 600μ is an abnormal cornea and needs careful examination to rule out storage disorders; they also recommend a specular or confocal microscopy to assist diagnosis.

The method of IOP measurement has already been discussed. GAT is of course difficult in an eye with marked nystagmus; a tonopen is easier. I have no experience with the Pascal tonometer but there must be the usual difficulties in a moving eye. And while we would correct for corneal thickness, the question of a "corneal" diagnosis for a cornea of this thickness remains.

Gonioscopy would be useful to seek abnormalities including a "developmental" type of angle. Pupillary block is unlikely but a "free" vitreous block can occur.

The eyeball is small. Along with axial length and if possible refractive status of eye, B-scan for (sclero choroidal thickening and lens eye volume ratio, if possible) would help us diagnose nanophthalmos. In our case, the cause for glaucoma would be a different mechanism from the usual nanophthalmos but the diagnosis would be important to decide on sclerotomies as part of the planned surgical intervention.

Phacolytic glaucoma usually occurs in a cataractous lens. I believe there is a case on record where phacolytic glaucoma developed 65 years following extra capsular cataract surgery in a child with congenital cataract.

The optic nerve head is described as small and anomalous with moderate pallor. Optic atrophy is a differential diagnosis for this patient that would fit in with poor vision and nystagmus. We do not have any information about the neuroretinal rim status and cupping. A Goldmann style contact lens would stabilize the eye and allow a stereoscopic examination of the optic disc.

Glaucomatous changes, if detected can put the diagnosis on a firm footing and help plan management.

Visual fields, photographs and images of the optic nerve are obviously impossible to obtain. A confrontation test may pick up gross abnormalities, and as with light projection, a field defect respecting the vertical meridian would point us in a different direction. Confrontation fields can detect only deep defects, but have a high specificity.

The patient was on 4 different anti-glaucoma medications. We are not sure how they were started, and which ones are actually working. Also we have no information on the baseline IOP; the corneal thickness would not affect the baseline alone.

Difficulty in instilling eye drops and non-compliance have been mentioned. Difficulty in instilling eye drops is easily checked but assessing compliance is difficult. In other fields of medicine it has been shown that the question: “Since we last met, have you missed any of your medication”, if responded to in the affirmative, is very specific for and indicates a gross degree of non compliance.[1]

2. Is glaucoma present?

   As discussed above, we need more information to reach a diagnosis. And as pointed out we should try and correct for corneal thickness. [2] Still, her corrected IOP on medications would be approximately 23 mm Hg. Either way; whether this is in fact glaucoma can only be

answered if we have more details on the optic disc. Optic disc pallor and nystagmus point to a different cause as the major contributor towards loss of vision.

3. Initial and subsequent management.

We would examine the optic disc and additionally get our corneal colleagues to opine. IF the diagnosis of glaucoma is confirmed, the question of further management arises and several options have been clearly discussed.

As in every case, we first discuss the objectives of treatment and options with the patient, keeping in mind the fact that the vision is already quite poor and that it is not improvement we are after. Additionally, in this type of case there is usually no "best data" evidence (we use that term instead of "evidence based medicine" as the latter raises too many hackles; additionally an experienced clinician's individual experience may be the only data we have, which, depending on the clinician can be very sound too). There is no one-way to manage this difficult patient and we would take extra care to take the patients' values into consideration. In this type of "toss up" situation, the management choice is probably best determined as a formal clinical decision analysis with the assistance of an experienced clinical epidemiologist. A rapid version of such an analysis that "doesn't do too much violence to the truth" can also be used.[3] This depends on calculating a "Likelihood of Help versus Harm" (LHH) and works like this.

The goal is to preserve existing vision. If left alone, let us assume a 100% risk of loosing vision over 5-10 years, reducing to 15% (approximately) with intervention (an 85% chance of success). That means a rounded off number needed to treat (NNT) of 2.[1,4] For an intervention in this kind of advanced disease, the chances of a wipe out are about 1% (personal communication Thomas R, R Parikh unpublished data on 100 eyes with advanced glaucoma as evidenced by split fixation with a size V target on the macular program). Let's use the higher end of the confidence interval, which is 3%. In this specific patient, should we assume

that the risk of wipe out and other sight threatening complications (nanophthalmos anyone?) is around three times higher, say 10%? The number needed to harm (NNH) is therefore 10. At this stage, the LHH is 1/ NNT : 1/ NNH or 1/2 : 1/10 that is 5 in favor of treatment. We then ask the patient what value he puts on preserved vision for 5 – 10 years, and what his feelings are about a risk of actually loosing his vision in the immediate post operative period. There are graphical means of doing this. If the patient's risk taking behavior is in favor of the long term, and she feels that long term visual preservation is 5 times preferable, the LHH becomes ½ x 5: 1/10 = 25 times more likely to be helped versus harmed.

On the other hand, if, as is usual, the patient considers a small risk of immediate loss of vision to be 10 times worse than loosing it over a period of 5-10 years, the LHH is ½ : 1/10 x 10 = twice as likely to be harmed versus helped. We then do a sensitivity analysis: for example, what if the patient feels that "immediate" loss of sight is 100 times worse than a slow loss? The LHH becomes ½ versus 1/10 x 100 = 20 times as likely to be harmed versus helped. The sensitivity analysis can be repeated for different NNT's and NNH and at different times to get a true feeling for the direction the patients really wants to go. If this is consistent, that is what we do. The reader is referred to our bible for a more detailed yet simpler (than what I can do) explanation, as well as alternative methods of such an analysis.[3]

The options to be exercised if the patient chooses surgery have been nicely discussed. Considering the vision, we would likely use titrated laser cylcophotocoagulation as primary procedure. If the patient opts to continue medical Rx, we would optimize it, starting by checking which of the drugs is actually working and then add on whatever is needed.

Reference:

1. Sackett DL, Haynes RB, Guyatt GH et al. Clinical Epidemiology. A Basic Science for Clinical Medicine. New York: Little, Brown and co., 205-9, 1991.

2. Ehlers N, Hansen FK, Aasved H. Biometric correlations of corneal thickness. Acta Ophthalmol (Copenh). 1975; 53:652-9.
3. Sackett DL, Straus SE, Richardson WS et al, Evidence-Based Medicine, How to Practice and Teach EBM. Second edition, Churchill Livingstone, Edinburgh, 2000; 124-166.
4. Thomas R, Padma P, Braganza A et al. Assessment of clinical significance: the number needed to treat. Indian J Ophthalmol. 1996; 44(2): 113-5.