An Interesting Case of a Young Caucasian Female with Multiple Sclerosis and Concurrent Low Tension Glaucoma

ABSTRACT

A young patient with multiple sclerosis presents with bilateral large cupping, disc pallor, normal IOPs, and VF loss consistent with normal tension glaucoma. We perform a methodological investigation to rule out other etiologies of the optic neuropathy.

I. CASE HISTORY

Patient Demographics: 41 year old white female

Chief Complaint: Patient was sent to VA eye clinic by outside eye care provider to evaluate suspicious appearance of optic nerves

Ocular/ medical history: Multiple Sclerosis (remitting/relapsing type) x 8 years
Depression
Eczema
Presumed ocular migraines

Medication: Bupropion - depression
Artificial Tears – dry eye
Citalopram Hydrobromide – depression/anxiety
Hydrophor ointment – dry skin
Interferon beta – MS
Triamcinolone Acetate – itch/skin rash
Ibuprofen – MS associated pain/discomfort
h/o short term pulse steroid for MS

Other salient information: no known history of optic neuritis OU
no color vision defects
no history of vision loss
no pain on eye movements

II. PERTINENT FINDINGS

Clinical: BCVA 20/20 OD and OS
Confrontation Fields: full OD/OS
Pupils: RRL (-)APD
Versions: SAFE
Amsler: WNL OD/OS
Red Desaturation: OD=OS
Color Vision: normal OD/OS

Slit Lamp: normal and clear OD and OS

ONH: large discs OU, no disc edema OU
OD: 0.80 diffuse pallor, very thin inf./inf.temp. and nsl. rim, PPA
OS: 0.85 diffuse pallor, very thin inf./inf.temp. rim, PPA
Posterior pole and periphery clear and normal OD and OS

Physical: Patient walks with cane due to muscular problems

Laboratory Studies: Lyme Screen negative
Low INR
Low Vitamin D

Radiological Studies: Numerous MRI ranging from 1/2009 to 5/2010 have been consistent with MS and report stable results with multiple lesions with configuration compatible with MS. No presence of other lesions (tumor, aneurysm, hemorrhage). There is no enhancement of any lesion with Gandolinium to suggest presence of an active demyelinating plaque.

Others:
TMax pre-treatment 15/15
Gonioscopy: open 360 OD and OS
Pachymetry: average (554, 552)
VF History: all results are very reliable
   OD: shows superior defect which may be showing slight progression
   OS: shows a dense superior defect which has likely shown some progression

Spectralis OCT RNFL analysis:
   OD: outside normal limits superior and inferior and borderline
defects temporally and nasally
   OS: outside normal limits inferiorly and temporally, borderline
   nasally and within normal superiorly

HRT: OD shows borderline rim defects nsl. and sup.nsl. which progress to also include inf.nsl. over two years
   OS shows sup.temp. and sup.nsl. abnormal rim defects along with inf.nsl. borderline defects which progress to also include borderline defects inf.temp. and nsl. over two years
III. DIFFERENTIAL DIAGNOSIS

Primary: Normal Tension Glaucoma OU

Other: Previous episode of subclinical bilateral optic neuritis (no history of optic neuritis and no history of clinical symptoms)
Intracranial space occupying lesion/mass (not shown on numerous MRIs)
Lyme (negative Lyme titer)
Toxoplasmosis (No presence or retinal signs such as vitritis or chorioretinal scarring)

IV. DIAGNOSIS AND DISCUSSION

Elaborate on the condition:

This is a case of a young Caucasian female with onset of Multiple Sclerosis 8 years ago who presented to us 6 years after her diagnosis with large pale optic nerve cupping OU but without optic neuritis. She reports no current symptoms and no history of symptoms representative of optic neuritis. We performed a methodological investigation to rule out other etiologies of the optic neuropathy. Intracranial space occupying lesion or mass was ruled out by numerous MRIs. The Lyme titer was negative, no retinal evidence such as chorioretinal scarring or vitritis were evident to support the differential diagnosis of Toxoplasmosis.

This patient has been evaluated by ophthalmology for a second opinion and the report is in agreement that her presentation is consistent with low tension glaucoma rather than a previous episode of optic neuritis and they are in agreement with treatment using eye pressure lowering medication.

Multiple Sclerosis is generally considered an autoimmune disease process where a damaged immune system begins to attack its own myelin as if it were a foreign substance. While the exact cause of MS remains unknown, it has been postulated to be triggered by a virus, toxins, other environmental factors, or genetics. It has been suggested that there is no one MS initiating virus, but that a relatively common virus such as measles or herpes may act as a trigger for the immune system to destruct oligodendrocytes which produce myelin in the brain. Scar tissue forms in the white matter of the brain and spinal cord and leads to formation of plaques which are accompanied by inflammation. As a result axons are left exposed and unable to normally transmit nerve impulses which are slowed or blocked completely (8).

There is a well known connection between optic neuritis and MS, optic neuritis often being the primary manifestation of the disease with risks of developing subsequent MS increasing with increased incidences of optic neuritis. Young adults are typically affected
by optic neuritis, which as its name suggests is an inflammatory disease of the optic nerve, statistically women being affected more than men. The visual prognosis for those suffering from optic neuritis is typically good but visual function after the resolution of neuritis is generally never complete. Our patient has no known history of optic neuritis and denies any landmark symptoms or history of eye pain, pain on eye movements, dramatic vision loss, color vision changes, Uhthoff’s sign, and Pulfrich phenomenon. She has no APD and shows dramatically cupped optic nerves which exhibit symmetrical pallor. Repeatable and reliable visual field defects which may possibly be progressing are present in both eyes.

NTG also still remains a somewhat ambiguous disease. Damage to optic nerve tissue and visual field loss occur in the absence of a documented intraocular pressure of above 21 (by most classifications) and with open angle structures. NTG has been proposed to have aspects that are both pressure sensitive and pressure insensitive. Glaucoma by definition is a progressive optic neuropathy, but a significant percentage of patients in the Collaborative Normal Tension Glaucoma Study (CNTGS) did not show progression (2). Many courses of NTG appear non-progressive if left untreated (1).

Functional impairment and loss of optic nerve axons occurs in both MS and glaucoma. In glaucoma the IOP can contribute to blocking axoplasmic transport which could result in neurotransmission depletion and decreased effectiveness of the remaining normally-conducting axons. This axonal transport is also blocked by demyelinating lesions such as those in MS.

There is highly significant reduction in RNFL thickness in patient affected with MS compared to control eyes. Importantly for our case this was found in patients with or without optic neuritis antecedents. One study showed that other measures such as VA, VFs and color vision were globally less altered than the OCT. Also "retinal nerve fiber layer of patients without optic neuritis is thinner than disease-free normals so that chronic optic axonal loss can be frequent in multiple sclerosis" (14). Our patient could have had RNFL loss contributing to the appearance of the ONH without a previous episode of optic neuritis.

Work has been done recently to show the connection between NTG and abnormal autoimmunity which may show a previously unknown link to multiple sclerosis. Cartwright et. al.(6) studies support an association between susceptibility to glaucomatous damage and immunoreactive tendencies. Tezel et al. (7) suggested that NTG may have autoimmune etiology by showing that autoantibodies may make the optic disc susceptible to glaucomatous damage. Another study (11) attempted to gain information about the possible immunological mechanisms in glaucoma and found that anti-myelin protein antibodies were found in sera of glaucoma patients. The same proteins can also be detected in patients with MS. It is thus feasible to propose that a bilateral subclinical event of optic neuritis may render an optic nerves more susceptible to intraocular pressure.
A study done in Poland (10) suggested that optic neuropathy in MS and glaucoma neuropathy are very common ophthalmological diseases. Optic nerve injury can result from over expressed vasoconstrictive mechanisms in both diseases. Poor perfusion to the optic nerve may play a part in the pathophysiology of NTG and vasospasm can lead to that poor perfusion (3,4). Comogly et al (5) found glaucomatous visual field defects in the 62% of normotensive patients with migraines, suggesting a relationship between the pathophysiology of NTG and migraine. CNTGS found that patients with migraine manifested a 2.58-fold risk for NTG progression over those patients not suffering from migraines. Our patient presented with a history of presumed ocular migraines which may be causing her already predisposed nerve to become even more susceptible.

Regardless of whether MS is caused by autoantibody activity or the auto antibodies are coerced into action by the presence of MS demyelinating lesions, the autoantibody presence in MS patients is undisputed. It is thus reasonable to postulate that NTG may be a glaucomatous condition that is affected more by antibodies damaging retinal tissue and inducing apoptosis than by IOP (6,7). In patients presenting with advanced optic neuropathy and history of multiple sclerosis it is recommended that precise morphological optic disc evaluation be performed because glaucoma neuropathy may appear (10). These patients have been predisposed to neuropathy by other factors and with poor perfusion to the optic nerve head it is more likely that the tissue would become even more susceptible to pressure effects despite the fact that the pressure never goes outside of normal range.

V. TREATMENT, MANAGEMENT

Treatment and response to treatment: Alphagan P OU without adequate reduction in IOP followed by Travatan Z OU with approximately 30-35% reduction in IOP OD and OS. Patient is currently closely monitored for normal tension glaucoma.

VI. CONCLUSION

The pathophysiology leading to optic neuropathy in MS can be multifactorial and it is thus essential to keep in mind the many causes which could lead to such a pathologic appearance. It is also important to remember that having a systemic disease may cause the optic nerve of a patient to become more susceptible to damage from other typically less threatening factors such as IOP. Multiple sclerosis and vasculopathy are some of these predisposing factors which may play a role in this case. A regular detailed morphological optic disc evaluation should be performed because glaucoma neuropathy may materialize in patients presenting with multiple systemic pathologies.

BIBLIOGRAPHY:


