Clinical Findings and Management of Diabetic Papillopathy: A Case Report

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Abstract

Diabetic papillopathy is an uncommon ocular manifestation of diabetes that is associated with a rapid decrease in hemoglobin A1c. The typical presentation of this condition tends to be asymptomatic with normal intracranial pressure. This case report describes a 64-year-old Caucasian male presenting with diabetic papillopathy. Because this is a diagnosis of exclusion, magnetic resonance imaging, magnetic resonance venography, and lumbar puncture must be performed to rule out other possible causes of optic disc edema, including ischemia, infection, inflammation, infiltration, increased intracranial pressure from space-occupying lesions, and idiopathic intracranial hypertension.

KEYWORDS
diabetes, ocular manifestations, papillopathy, differential diagnosis

INTRODUCTION

Diabetic papillopathy is an uncommon cause of optic disc swelling that occurs in patients with diabetes mellitus (DM).[1,2] Characteristic clinical features are hyperemic optic disc edema with otherwise unremarkable diagnostic test results. The pathophysiology of diabetic papillopathy is unclear, but the literature suggests that a contributory factor is diabetic microvascular changes causing fluid leakage into the optic nerve.[1-5] This condition has also been associated with a rapid lowering of blood sugar.[2,4,6] Diabetic papillopathy is considered a diagnosis of exclusion; therefore, diagnostic testing to rule out all other possible causes of optic disc edema should include cranial imaging for the detection of space-occupying lesions, lumbar puncture to determine intracranial pressure (ICP), and serological studies of the cerebral spinal fluid (CSF) to rule out infectious, infiltrative, and inflammatory causes.[1,4,7]

Although diabetic papillopathy is a relatively benign, self-limiting condition with minimal visual impact, cases have shown that the use of intravitreal bevacizumab injections may hasten resolution in individuals with significant visual reduction.[8,9]

CASE REPORT

A 64-year-old Caucasian male presented for his 1-month post-operative examination following cataract surgery of his left eye (OS). He reported no visual changes or concerns and was currently using 1% prednisolone acetate ophthalmic suspension once daily in his left, post-operative eye. The patient's ocular history was significant for type II DM without ocular manifestations and cataract extraction with posterior chamber intraocular lens implants in both eyes (OU). The patient had a history of type II DM for 10 years, rheumatoid arthritis, hypothyroidism, and hypertension. His medications included amlodipine, glipizide, levothyroxine, losartan, metformin, methotrexate, and saxagliptin. He was allergic to penicillin and lisinopril. His hemoglobin A1c (HbA1c) levels had decreased by 1.5% in the month of presentation compared to the level recorded 3 months previously (Table 1).

On examination, his best corrected visual acuities (BCVA) were 20/20-2 in the right eye (OD) and 20/30+2 in the left eye. BCVA OS was 20/25 prior to developing a visual significant cataract and undergoing cataract surgery. Pupils were equally round and reactive to light with no relative afferent pupillary defect. Extraocular movements and confrontation visual fields were full. Intraocular pressures with Goldmann applanation tonometry were 17mmHg OD and 15mmHg OS. Anterior segment of the eyes was unremarkable and he was pseudophakic in both eyes.

Dilated fundus exam of the optic nerve revealed grade 4 disc edema OD with peripapillary hemorrhages 360° and grade 2 disc edema OS with a few hemorrhages (Figures 1,2), which were graded using the Modified Frisén Scale (Table 3). The posterior pole of the retina showed multiple scattered hemorrhages and vessel tortuosity OU. Spectral domain optical coherence tomography (SD-OCT) of the retinal nerve fiber layer (RNFL) showed significant RNFL thickening, with a global value of 244 μm OD and 210 μm OS. SD-OCT of the macula was normal without macular edema OU.

The patient was diagnosed with bilateral optic disc edema and moderate non-proliferative diabetic retinopathy (NPDR) without macular edema, which was worse in the right eye, according to the Early Treatment for Diabetic Retinopathy Study (ETDRS). Due to these findings, a more detailed review of systems was conducted. He denied any headaches, nausea, ocular pain, malaise, or transient vision loss. There were no reports of vitamin A supplement, corticosteroid, or recent tetracycline use. His blood pressure was 126/66 mmHg in an office setting. He was subsequently admitted to the emergency room for a neurological work up, including imaging, lumbar puncture (LP), and complete blood count (CBC), to determine the cause of the optic disc edema.

Diagnostic Testing

Computed tomography (CT), magnetic resonance imaging (MRI), and magnetic resonance venography (MRV) of the head showed no abnormalities to account for the optic nerve swelling. His neurological examination was also unremarkable. Lumbar puncture (LP) revealed an opening pressure of 16cm of H_2O (normal range in adults 6-25cm of H_2O) and unremarkable cerebral spinal fluid (CSF). CBC results were normal. These test results ruled out the possibility that his symptoms were due to any space-occupying lesions, infections, or an increase in intracranial pressure.

Follow up visits

At his follow-up visits, his BCVA remained stable. The amount of optic nerve edema decreased at each subsequent visit at 1 month and 3 months, and had resolved by the 5-month follow-up. Resolution of the optic disc edema remained stable at his 7-month follow-up. Humphrey visual field 24-2 SITA (Swedish Interactive Testing Algorithm) Faster acquired on his 7-month follow-up showed scattered superior defects OD and scattered edge defects OS with good reliability; however, this was the patient's first visual field test and a repeated test will be beneficial. Figures 1-13 and Tables 2 and 4 demonstrate the continuous improvement in optic disc edema over the 7 months after initial presentation.

After extensive testing to exclude any other possible etiologies, the final diagnosis was diabetic papillopathy. This is consistent with the patient's lack of symptoms, moderate NPDR, and the rapid decrease in his HbA1c levels. By his 5-month follow-up, the optic disc edema had resolved and remained stable at his 7-month follow-up.

Table 1: *HbA1c levels over the past year.*

Date	HbA1c (%)
Apr 2018	7.8
Nov 2018	7.8
Jun 2018	9.3
Sep 2018*	7.8
Jan 2019	9.4

*Last HbA1c before presentation

Table 2: *Global RNFL over time*

	Right Eye (μm)	Left Eye (μm)
Initial Visit	244	210
1-month follow-up	165	131
3-month follow-up	118	112
5-month follow-up	98	101
7-month follow-up	101	98

Table 3: *Modified Frisén Scale*

Modified Frisén Scale	
Grade	Characteristics
0 – Normal	Radial NFL without tortuosity
1 - Minimal	No elevation of borders Obscuration of the nasal border of the disc Disruption of normal radial NFL arrangement Normal temporal disc margin
2 – Low	Elevation of nasal border Obscuration of all borders Peripapillary halo No major vessel obscuration
3 - Moderate	Elevation of all borders Obscuration of all borders Peripapillary halo Obscuration of one or more segment of a major blood vessel leaving the disc
4 - Marked	Elevation of entire optic nerve head Obscuration of all borders Peripapillary halo Total obscuration of a major blood vessel on the disc
5 – Severe	Total obscuration of a major blood vessel on disc and partial obscuration of all vessel on disc

Table 4: *Grade of optic disc edema based on the Modified Frisén Score over time*

	Right Eye	Left Eye
Initial Visit	4	2
1-month follow-up	2	1
3-month follow-up	1	1
5-month follow-up	0	0
7-month follow-up	0	0

Figures 1–8: *Fundus photographs*

Figure 1: Initial visit, right eye

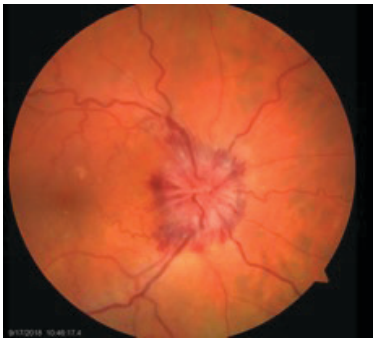


Figure 2: Initial visit, left eye

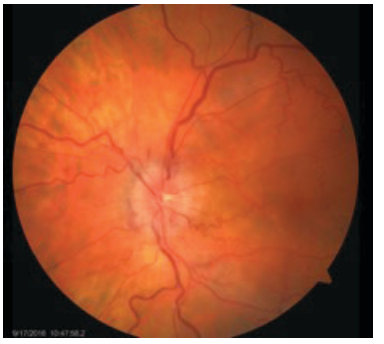


Figure 3: 1-month follow-up, right eye

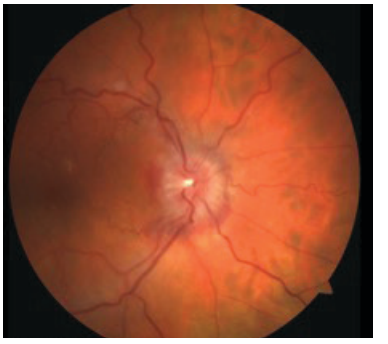


Figure 4: 1-month follow-up, left eye

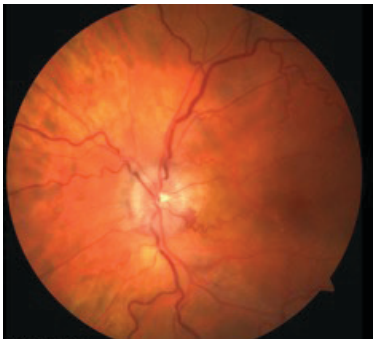


Figure 5: 5-month follow up, right eye

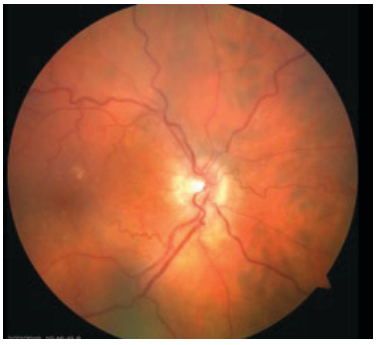


Figure 6: 5-month follow up, left eye

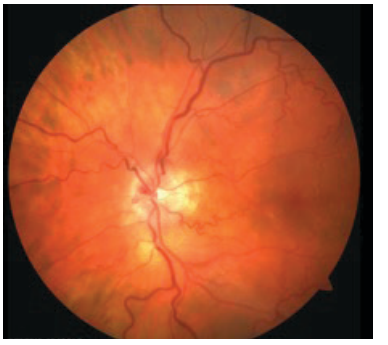


Figure 7: 7-month follow up, right eye

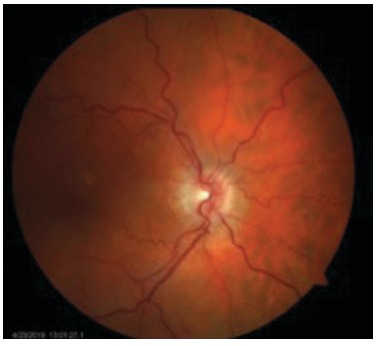


Figure 8: 7-month follow up, left eye

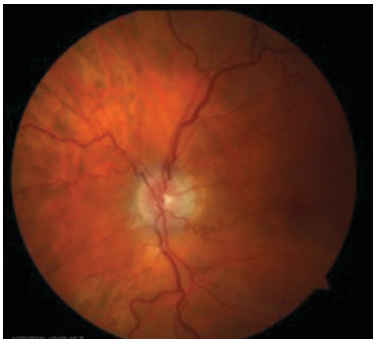


Figure 9: *Spectralis SD-OCT at the initial visit, right eye*

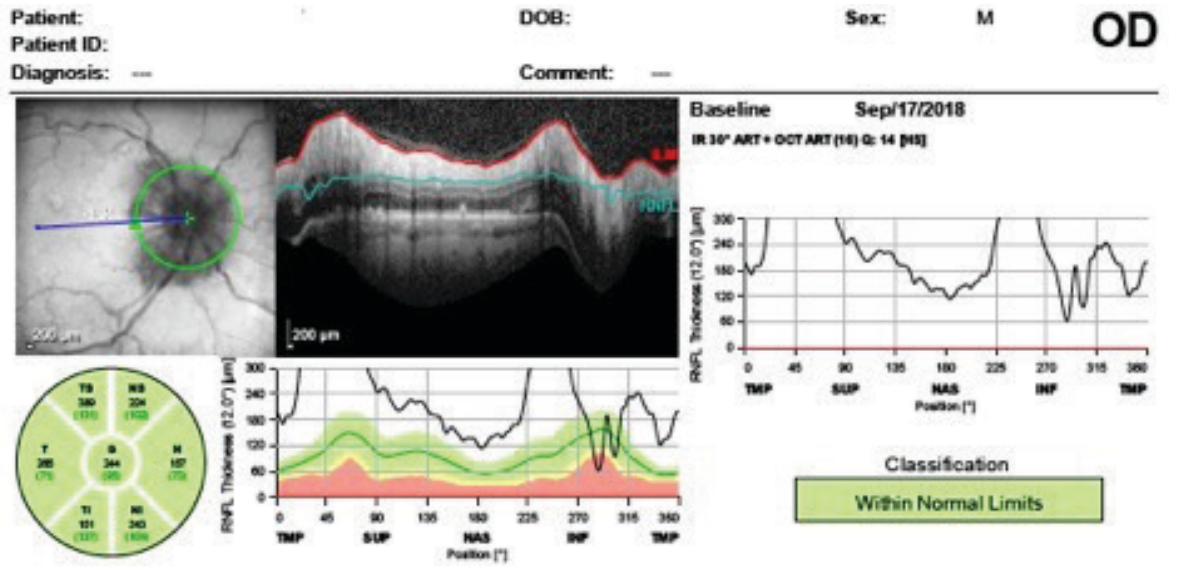


Figure 10: *Spectralis SD-OCT at the initial visit, left eye*

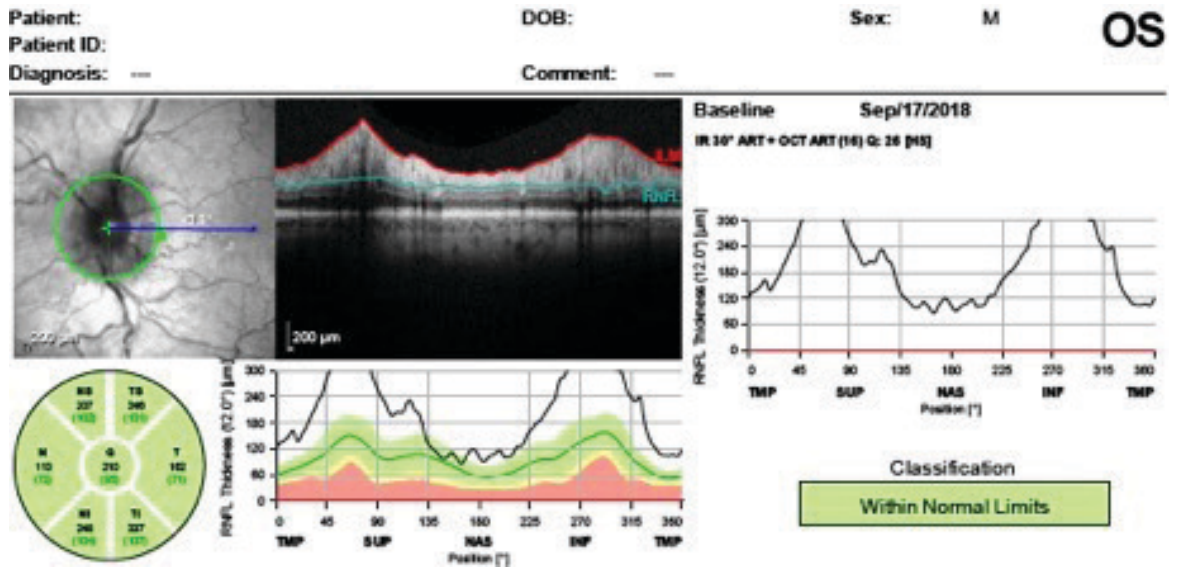


Figure 11: *Spectralis SD-OCT at the 7-month follow up*

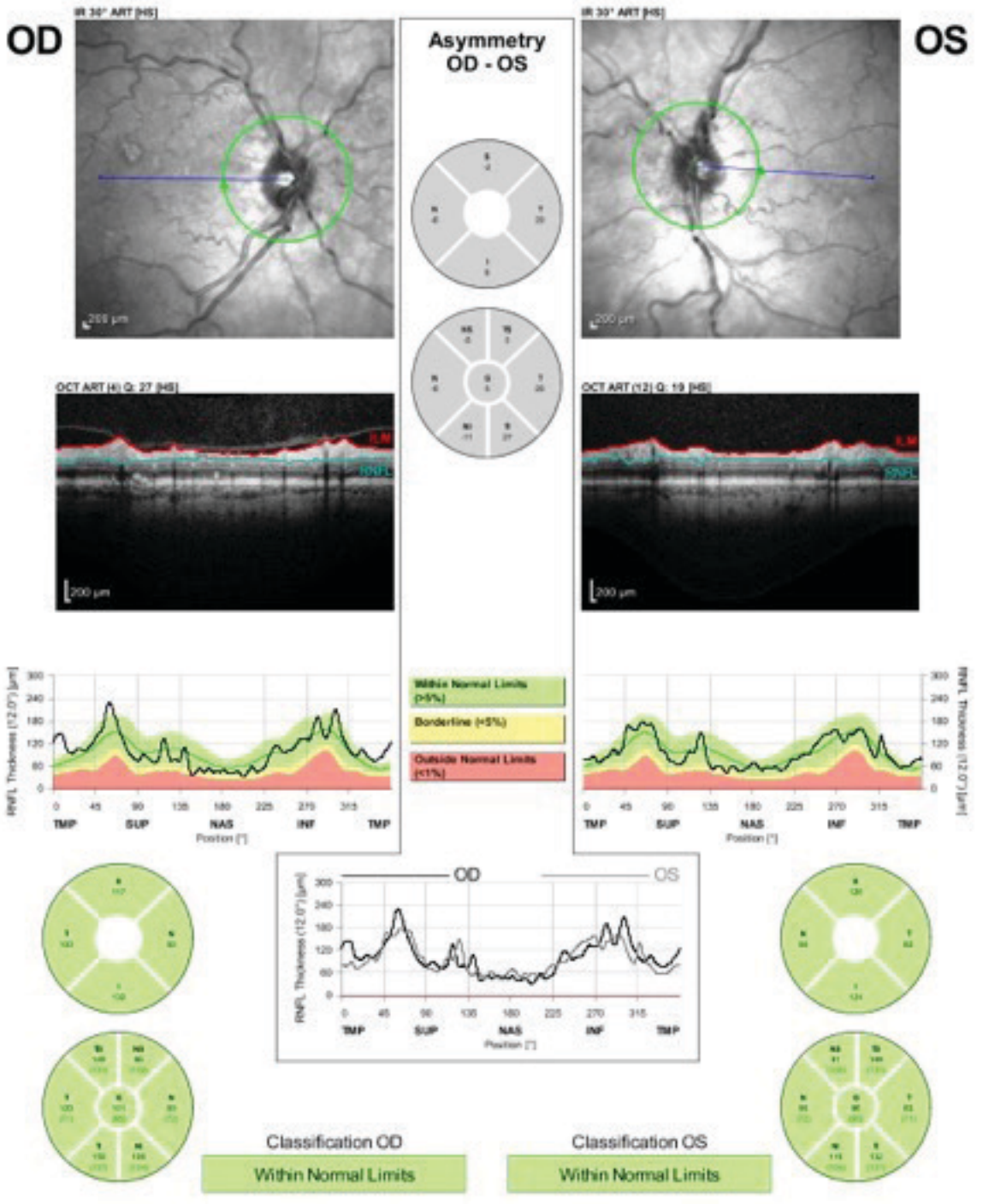
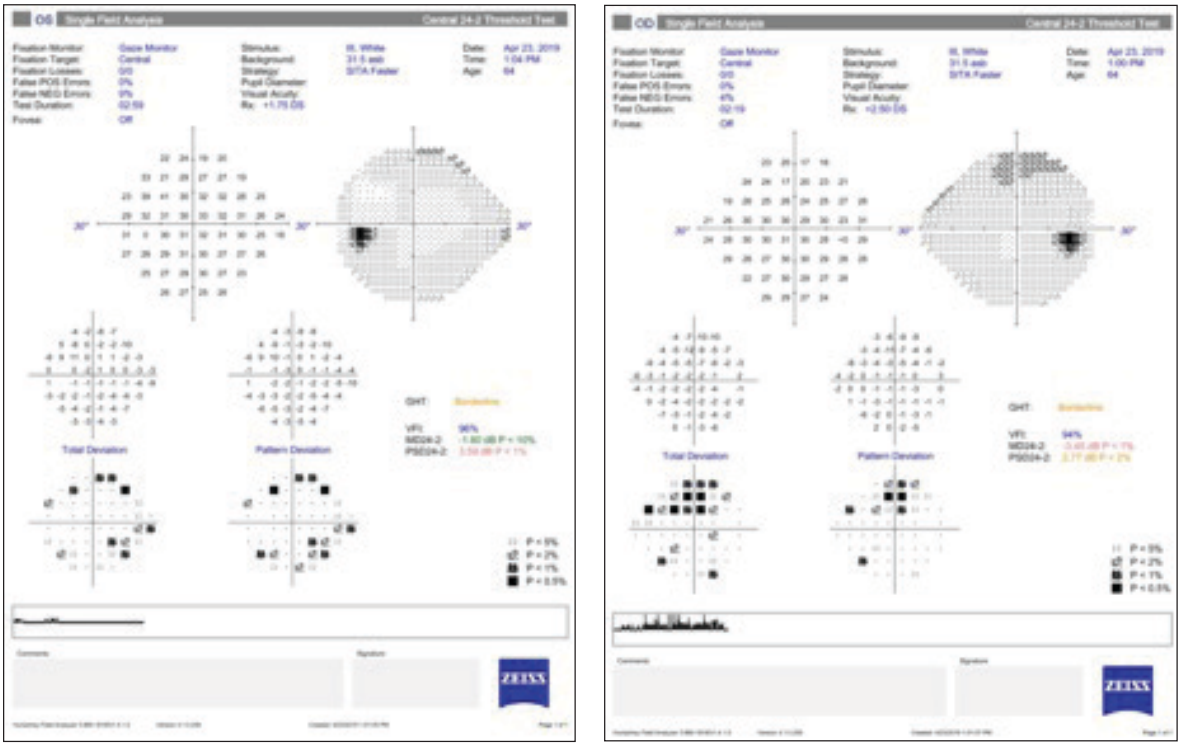


Figure 12: *Humphrey Visual Field 24-2 SITA Faster at the 7-month follow-up*



DISCUSSION

Diabetic papillopathy is a rare cause of optic disc edema that is seen in 1.4% of diabetic patients; it is considered a diagnosis of exclusion.[1,2,10] The condition may affect patients with either type I or II DM without any age, race, or gender predilection, and is often underdiagnosed due to its largely asymptomatic, transient nature.[1,2] Patients affected with this condition generally have minimal to no visual disturbances or visual field loss, and an afferent pupillary defect is typically not present.[3] Visual acuities may be affected in cases with concurrent macular edema, and a typical visual field defect is an enlarged blind spot.

Diabetic papillopathy can present unilaterally or bilaterally, and is usually accompanied by signs of mild NPDR (though it may appear with any level of retinopathy or in the absence of retinopathy).[1] Characteristic fundus findings include hyperemic optic disc swelling and telangiectatic vessels on or around the disc.[2,3] Clinically significant macular edema is associated with 50-70% of eyes with diabetic papillopathy.[1,2] Fundus fluorescein angiography (FA) will show focal or diffuse early hyperfluorescence on the disc with late leakage from telangiectatic vessels.[2]

The pathogenesis of diabetic papillopathy remains unclear, though it is likely due to diabetic microvascular changes. The literature suggests that the disc edema is caused by superficial, retinal vascular disturbance with transient leakage of fluid into and around the optic nerve head.[1] Some studies suggest that the disc edema originates from deeper within the optic nerve head, due to some vascular compromise that disrupts axoplasmic flow.[1] Although the first report of diabetic papillopathy dates back to 1971, there is still much debate to whether it is its own entity, a manifestation of diabetic retinopathy, or a form of anterior ischemic optic neuropathy (AION).[1-5] Metabolic control may also contribute to the development of diabetic papillopathy as it was found that there is a marked association between diabetic papillopathy and patients with a recent drastic reduction of HbA1c and small cup-to-disc ratios.[2,4,6,11] Therefore, an HbA1c reduction of no more than -1.0% per quarter year is recommended.[4] In this case, the patient's HbA1c levels had decreased by 1.5% in the month of presentation compared to the level recorded 3 months previously.

Grading optic disc edema

Optic disc edema can be graded qualitatively using the Modified Frisén Scale (MFS) or quantitatively using OCT.[12] The MFS uses key characteristics to assign a grade from 0 (normal optic disc) to 5 (severe edema), as indicated in Table 3.[12] Fundus photographs are helpful when using the MFS. The MFS is better suited for categorizing higher-grade edema and observing key features, while OCT is superior for lower-grade edema where subtle changes in the optic nerve are more difficult to discern.[12] Additionally, the OCT RNFL thickness-processing algorithm often fails with higher-grade edema.[12] The mean RNFL thickness on the Spectralis SD-OCT in the average population is 97.3 ± 9.6 μm.[13] At his initial presentation, the patient had grade 4 edema and grade 2 edema on the MFS, and a global RNFL thickness value of 244 μm for the right eye and 210 μm for the left eye. MFS was initially better suited for monitoring due to possible OCT RNFL algorithm failure with higher disc edema.

Combined use of the MFS, fundus photographs, and OCT provides the best documentation to evaluate the overall clinical course of optic disc edema.

Differential Diagnosis

Since diabetic papillopathy is a diagnosis of exclusion, it is critical to rule out other possible causes such as AION, optic neuritis, and increased intracranial pressure from space-occupying lesions, infection, and inflammation.[4] Patients with AION typically present with profound and sudden vision loss with a dense altitudinal visual field defect.[2] Optic neuritis is usually associated with ocular pain, dyschromatopsia, and visual field loss.[1] Increased intracranial pressure from space-occupying lesions, infection, or inflammation can be excluded with cranial imaging (MRI, MRV CT), CSF studies and blood work. Idiopathic intracranial hypertension will present with increased opening pressure on LP and is often associated with headaches, diplopia, and malaise.[7] MRI and CT can help detect space-occupying lesions and MRV can help detect venous sinus thrombosis.[14] There is a wide variety of infectious causes such as sarcoidosis, trichinosis, and toxoplasmosis.[15] Infectious etiologies can be confirmed with laboratory testing such as CBC, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), polymerase chain reaction (PCR), and serological testing.[16] Inflammation, such as in meningitis, can increase ICP by reducing CSF reabsorption.[15] Pseudopapilledema is the anomalous elevation of the optic disc due to drusen and can be diagnosed with a B-scan or fundus autofluorescence (FAF) of the optic nerve.[17] Certain medications can also cause disc edema such as estrogens, tetracyclines, corticosteroids, and vitamin A.[18]

Treatment

Diabetic papillopathy is often monitored without intervention due to its self-resolving nature and benign course.[8] Resolution can range from 3-12 months after initial presentation.[3] Patients may have mild pallor of the optic discs upon resolution in cases of prolonged disc edema.[19] The degree of edema has not been found to correlate with the initial acuity or visual outcome.[19]

In cases of vision loss, anti-vascular endothelial growth factor (anti-VEGF) injections may be beneficial.[8,9] Eyes injected with intravitreal bevacizumab showed a marked regression of disc edema and improvement in visual acuities at the 2-week follow-up.[8,9] However, further studies will be needed to prove its efficacy and safety in diabetic papillopathy.

CONCLUSION

This case reports discusses the diagnosis and management of a patient presenting with characteristic findings of bilateral diabetic papillopathy; i.e., hyperemic disc edema and unremarkable findings on neurological testing, cranial imaging, intracranial pressure, serology, and cerebral spinal fluid composition. The worldwide prevalence of diabetes has grown rapidly over the last few decades, and it is imperative for eye care providers to be familiar with some of the less common ocular complications of diabetes, including diabetic papillopathy. Furthermore, it is critical to differentiate diabetic papillopathy, a benign, self-limiting condition, from more life-threatening conditions that can cause optic disc edema. ●

FINANCIAL DISCLOSURES:

The author(s) have no propriety or commercial interest in any material discussed in this article.

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