Four AION Low Vision Cases

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Introduction

For those interested in vision rehabilitation following AION, (anterior ischemic optic neuropathy), I present four cases seen by myself and a team of vision rehabilitation professionals at the Virginia Department for the Blind and Vision Impaired, DBVI. AION is essentially a stroke within the optic nerve, which is part of the central nervous system rather than a peripheral sensory nerve. These patients were referred without distinction as to which type, (arteritic or non-arteritic), of AION caused the vision loss.

Case #1

A 55-year-old male was referred in 2017 by his neuro-ophthalmologist to the Virginia Department for the Blind and Vision Impaired, DBVI, with bilateral 'stable' AION. At that time his uncorrected distance acuities were OD 20/100, OS 20/500, and OU 20/100. The patient's DBVI case manager, a vocational rehabilitation counselor, then provided an in-home functional vision assessment. The patient's primary visual goals involved completing tasks required by his current position as manager of a manufacturing plant. This involved not only paperwork and computer work, but inspections of machinery at intermediate distances. It involved spotting distant targets in the factory, both while walking and being seated. He had had the position for many years, and was familiar with the layout of the factory. Nevertheless, his DBVI case manager thought he might benefit from agency orientation and mobility training on the job. The patient was also referred for a DBVI assistive technology evaluation, to ensure that his computer software, and his skills, adequately compensated for his vision loss. The patient's wife had to drive him to and from work, and he was therefore very interested in driving with bioptics.

I provided a low vision exam in 2017. At that time the patient's uncorrected distance acuities were:

OD 10/100+1
OS 10/600
OU 10/80

The patient stated that he had lost vision in his left eye suddenly in 2015, and that he had lost vision in his right eye suddenly in 2016. He stated that he frequently found indoor environments to be too dark. However, he found that simply increasing lighting was rarely helpful. Therefore, he would normally decrease room lighting and add directional task lighting with a flashlight, which increased contrast without increasing glare. He would view his 70-inch television screen from a distance of 3 feet, with the room lights off. At this close distance he was able to read the scroll along the bottom of the newsfeed, and glare from the screen was not a problem. I explained that bothersome glare is frequently wavelength dependent. I demonstrated various light-colored lenses with side-shields indoors under fluorescent lighting, including red, green, yellow, amber, topaz, and plum. However, light-gray produced the best results. The patient stated that outdoors in bright sunlight, most sun-glasses were too dark. I therefore

demonstrated various shades of gray in bright sunlight. The patient preferred NoIR U-21 light-medium-gray sunglasses with side-shields.

The patient's confrontation visual fields in his right eye were approximately 20° up, down, and nasally; as well as 30° temporally. The patient's confrontation visual fields in his left eye were approximately 5° down and nasally; as well as 20° up; and 30° temporally. I explained that these results did not meet the requirements for driving in Virginia with bioptic lenses.

The patient stated that he had had Lasix corneal surgery in each eye ten years ago, and has never worn a distance correction. A 2.8X focusable distance monocular provided OD 10/40. A 4X 12° "Specwell" focusable distance monocular provided OD 10/25. He found the 4X version easy to use. For viewing distant targets in the factory while seated, I demonstrated various wearable binoculars. A 3X version provided 10/30 distance acuity. He preferred this to the 2.8X version. It was difficult for him to locate a distant target with both the 3.5X and the 7X (30°) versions.

The patient had a loaner desktop CCTV in his office which allowed him to complete his paperwork. However it was not portable, and it may not have had the features that were most appropriate for his work needs. This was to be addressed later, at his DBVI assistive technology evaluation. The patient had a Samsung smartphone, and was not aware of all its screen-reading and screen-magnification functions. He was planning to attend DBVI classes that address this, and receive DBVI training in this area.

The patient's uncorrected near continuous text acuity was 8M at 40cm. A pair of +4 readers provided 3M at 30cm. A pair of +6 readers provided 2.5M at 20cm. A pair of +8 readers provided 2M at 12cm. A pair of +4 readers in combination with a 4X LED-lighted stand magnifier provided a slow 1.2M continuous text acuity at 12cm. I felt that this combination might have been useful for reading papers on surfaces in the factory other than where he has access to his desktop CCTV. The patient preferred the LED-lighted stand magnifier to the yellow-lighted stand magnifier. A 3.5X LED-lighted hand magnifier provided 0.8M isolated letter acuity. This might be useful for spot-reading near targets throughout the factory.

For viewing intermediate-distance targets in the factory while seated, I demonstrated a pair of 2X "MaxDetails" wearable focusable tele-binoculars, which provided 2M isolated letter acuity at 40cm. The primary advantage of this intermediate-distance low vision aid is its portability. I demonstrated a 5D low-powered necklace hanging magnifier, which would also provide portable hands-free intermediate-distance magnification, and could be used while standing. The patient's DBVI case manager agreed to re-emphasize this distinction, and that 2X "MaxDetails" wearable focusable tele-binoculars can only be used safely when seated. I demonstrated a 2X "BigEye" table-lamp which provided 3M isolated letter acuity at 60cm. Combined with its 3X booster lens, 2M isolated letter acuity was provided at 60cm. Although the "BigEye" table-lamp could be useful at isolated workstations, his CCTV would clearly provide better function at his desk.

The patient's DBVI case manager provided the following list of trial low vision aids with the required training:

1. NoIR U-21 light-medium gray fit-over sun-lenses with side-shields for outdoors
2. NoIR U-20 light-gray fit-over lenses with side-shields for indoor glare as needed, possibly in combination with directional lighting
3. 3X SportsSpecs, to be used when seated only
4. 4X 12° focusable distance monocular
5. 2X "MaxDetails" wearable focusable tele-binoculars, to be used when seated only
6. 5D low-powered hanging necklace magnifier

7. +4 readers
8. 4X LED-lighted stand magnifier
9. 3.5X LED-lighted hand magnifier

Case #2

A 46-year-old male was referred by his neuro-ophthalmologist to the Virginia Department for the Blind and Vision Impaired, DBVI, with bilateral AION. At that time his uncorrected distance acuities were OD 20/50, OS 20/50, and OU 20/50. His Humphrey visual field results were less than 20° in both his right and left eyes. His neuro-ophthalmologist saw him several months following that, and noted variable field loss in each eye within the central 30° and that his field results were 'substantially better.' He noted uncorrected distance acuities of OD 20/60+/-, and OS 20/50-2. His refraction results were reported as:

OD +0.50 +0.50 X 013	20/50+/-
OS +0.50	20/40

He expected things to remain fairly stable, and requested a 15 month follow-up in absence of vision changes.

The patient's DBVI case manager, a vision rehabilitation teacher, provided an in-home functional vision assessment. The patient's primary visual goals involve reading newsprint, using his checkbook, and filling out forms. He was referred for DBVI orientation and mobility instruction, DBVI vocational rehabilitation, and a DBVI assistive technology evaluation.

I provided a low vision exam in 2017. At that time, his uncorrected distance acuities were OD 10/30, OS 10/40+2, and OU 10/30. The patient currently does not have a distance correction. His retinoscopy results were plano in each eye. Various light-colored tints were demonstrated indoors, and none improved comfort or contrast. The patient reported no indoor glare, and no prolonged dark or light adaptation times. For outdoor glare, the patient currently uses gray wrap-around safety lenses which fit closer and better than standard NoIR frames. He finds that his gray tint, equivalent to NoIR U–22 medium-gray, is always dark enough, and never too dark.

A 2.8X focusable distance monocular may be tried during orientation and mobility instruction, and dispensed if useful.

The patient's confrontation peripheral visual fields were horizontally restricted in each eye to approximately the central 40°. These fields were inferiorly restricted in each eye to approximately 10°.

The patient uses +1.50 OTC readers, which he reports are helpful at near. They provided 1M (newsprint) continuous text acuity at 40cm. Increasing the power to +2.50 improved subjective near acuity. Increasing the power beyond +2.50 did not. Therefore, the patient's only optical need at this point is a pair of OTC +2.50 readers.

When asked, "What bothers you most," the patient stated that it was his large day-to-day fluctuation in visual acuity. He stated that on the day of his low vision exam, his vision was relatively good, and he could see my facial features. He stated that on other days, he might not be able to see me at all. He attributed the frequency of days when his vision was, "really bad," to his level of stress. During a stressful week at work, he reports frequently having three or four days of, "terrible vision." During a non-stressful work week, he often has no days with significant visual difficulties. They do, however, sometimes still occur. During a non-stressful work month, for example, he reports having 6 to 7 days when his vision is, "kinda terrible."

With regard to vision fluctuation throughout a particular day, he stated that periods of concentrated visual focus make his acuity worse, but that it returns relatively quickly after a break. However, periods of prolonged stress throughout the day will reduce his overall vision for the rest of the day. This stress is often associated with attempting visual tasks beyond his ability. He understood the cycle of deteriorating vision throughout the day that this produces. He understood the need for breaking this cycle by eliminating those tasks beyond his visual ability, and by maximizing his visual efficiency. His official job title at the tractor-trailer repair shop where he works is, "Parts Clerk." He spends 6 to 8 hours of his workday on the computer. I mentioned "ZoomText" screen magnification and screen reading software, which could significantly improve his visual efficiency during the majority of his workday. An agency assistive technology evaluation will determine if this and/or other accommodations are warranted. The part of his workday that would remain visually challenging, however, is when he leaves his computer to assist mechanics with repairs. He reports this is intermittent and not required. He understood that by eliminating this largely self-imposed task, he could help interrupt the cycle of deteriorating vision throughout the day. The patient occasionally has to drive to pick up parts and make deliveries. Some years he hasn't had to do this at all, but sometimes he does this several days in a row. I asked him if he could make arrangements on the job so that he would not be required to drive. He stated that he could have the parts delivered to him by planning sufficiently, and that this would take care of that problem. When directly asked if he could do his job if he restricted himself to computer work, he replied, "yes." However, he stated that having a driver's license is a job requirement. He also stated that he could structure his work and plan his orders so that driving would not be required to do his job. I believe he will be better prepared to work with his vocational rehabilitation counselor after this discussion, and that he will perhaps begin to make preliminary changes in his workday to reduce visual stress, and to interrupt the cycle of deteriorating vision throughout the day.

Case #3

A 56-year-old male was referred by his ophthalmologist to the Virginia Department for the Blind and Vision Impaired, DBVI, with bilateral AION. At that time his left visual field was restricted to less than 10° and his distance acuities with the following correction were:

OD -0.75	CF
OS -1.25 +0.75 X 097	20/25

The patient's DBVI case manager, a vision rehabilitation teacher, provided an in-home functional vision assessment. The patient reported that a "stroke" in his left optic nerve in March of 2015 "took his left peripheral vision," and that an additional "stroke" in his right optic nerve in March of 2015 "took his right central vision." The patient's loss of color vision was also significant to his employment, since he had been testing pH and water chemistry in his previous job. The patient is significantly bothered by glare from direct sunlight and indoor fluorescent lights. He has noticed that patching his right eye reduces this glare, but it also removes input from the eye he describes as always having been his "sighting" eye, and he reported that although this did reduce glare, it also made him dizzy and quickly gave him headaches. Therefore, a pair of reading clips with a medium-tinted right lens might be worth trying. He has found that using a flashlight helps when reading. The directional nature of the light enables him to increase contrast while controlling glare.

I provided a low vision exam in 2017. At that time the patient's distance acuities with his current measured glasses were:

OD balance	10/600

OS -0.50 -1.00 X 015 10/10-3
(+1.50 progressive bifocal)

These lenses contained "Transitions" photochromic tints which he reported do not lighten fast enough indoors. Due to the patient's complaint of slow dark adaptation, I discussed the strategy of placing sunglasses on before entering sunlight, and of removing sunglasses only after returning indoors. I explained that this might help preserve "indoor vision" while outside in bright sunlight. The patient had not been aware of this. I also explained the importance of side-shields on sun-wear to help prevent slow dark adaptation.

A bifocal restricts the usable distance field within a frame, and further impairs the orientation and mobility of patients with restricted fields by increasing the need for head movements when scanning the environment. Therefore I recommended he no longer put either a bifocal, (lined or no-lined), or a photochromic tint in his glasses. His left distance refraction result was:

OS plano -1.00 X 010 10/10-3
(split PD 30mm)

Although this provided no improvement in objective distance acuity, it did provide a repeatable improvement in subjective distance acuity, including when outdoors. The patient said he was planning on buying a new pair of glasses regardless of my recommendations. Since there was a valid reason to remove both his photochromic tint and his progressive add, I prescribed the above refraction with a "balance" right lens in a single-vision distance prescription. I demonstrated various colored tints outdoors in bright sunlight, and the patient preferred medium-plum. Indoors, he preferred light-amber.

A 3X LED-lighted hand magnifier provided 0.4M continuous text acuity. A 4X LED- lighted stand magnifier provided the same acuity. The patient does most of his reading in a comfortable chair, and would therefore benefit from a lap-desk when using the stand magnifier. The patient uses a computer and could benefit from a DBVI assistive technology evaluation and a discussion of "ZoomText" screen-magnification software.

The patient's DBVI case manager referred the patient for DBVI orientation and mobility training, a DBVI assistive technology evaluation, and provided the following list of trial low vision aids with the required in-home training:

1. NoIR U-81 medium-plum fit-over sun-lenses with side-shields for outdoors
2. NoIR U-48 light-amber fit-over lenses with side-shields for indoors
3. 3X LED-lighted hand magnifier
4. 4X LED-lighted stand magnifier
5. Lap desk
6. +2.00 reading clips with a medium-amber right lens

Case #4

A 55-year-old male was referred by his neuro-ophthalmologist to the Virginia Department for the Blind and Vision Impaired, DBVI, with bilateral recent onset AION. At that time his distance acuities were OD HM and OS HM.

The patient's DBVI case manager, a vision rehabilitation teacher, provided an in-home functional vision assessment. The patient's visual goals involve reading his mail, signing his name, identifying money, cooking, and working on his computer. The patient reported losing vision in his right eye in 2016, and in his left eye in 2017. He bought his own cane and taught

himself some travel techniques, but will need DBVI orientation and mobility training. He was referred for this, as well as a DBVI assistive technology evaluation. The patient's DBVI case manager reported poor in-home lighting.

I provided a low vision exam in 2017. At that time the patient's uncorrected distance acuities were OD 4/225 and OS 4/300. These acuities were best with his chin down. At distances greater than 4 feet, his acuity reduced drastically. For example, the patient did not have 5/700. The patient's retinoscopy results were:

OD +0.50
OS plano
PD 57mm

The patient reported some improvement in vision since the onset of symptoms, when he had to ask whether or not there was daylight. At the time of his low vision exam, he reported that he could see the sun and large shapes. I discussed the importance of professional orientation and mobility training, and encouraged him to access that service through DBVI, since he had been reluctant to do so. As an example of a helpful technique he might learn through professional training, I described proper sighted guide travel techniques. Specifically, I advised him to use his left hand to grab his sighted guide's right elbow, to keep his slightly better eye on his unprotected side.

A 2.8X focusable distance monocular provided OD 4/180. A 4X 12° focusable distance monocular provided OD 4/100. A 6X version was too difficult to use. I demonstrated various light-colored tints to see if any improved comfort or contrast. The patient repeatedly stated that light-green provided a subjective improvement. He reported no outdoor glare, and had worn sun-lenses for eye protection only.

The patient's uncorrected near isolated letter acuity was 12M at 10cm. The following high plus spectacles provided these isolated letter acuities at 4 cm:

2X 10M
6X 2.5M
8X 2M

When viewing near targets with high plus spectacles, he preferred to use his right eye. A 10X spectacle-mounted right loupe provided 2M isolated letter acuity. A 15X version provided 1M (newsprint) isolated letter acuity, and 3M continuous text acuity. Therefore, the patient will need electronic magnification to achieve his goal of 1M (newsprint) continuous text acuity. This was possible with a portable CCTV, but print needed to be magnified to the point that only one word would fit on the screen. A desktop CCTV provided slightly better function, but the patient will most likely need a desktop CCTV with a speech option for long-term comfortable use.

The patient's DBVI case manager provided the following list of trial low vision aids with the required in-home training:

1. NoIR U-38 light-green fit-over lenses with side-shields as needed
2. 4X 12° focusable distance monocular
3. 15X spectacle-mounted right loupe for isolated-letter near spotting
4. Portable CCTV
5. Desktop CCTV

Conclusion

Looking for patterns is a valuable method of consolidating clinical experience in the art of low vision care. However, relative to cases involving other pathological mechanisms, AION patients demonstrate a relative lack of general patterns seen in vision rehabilitation strategies.