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Adjusting Astigmatism

Why do we prescribe lenses? Lenses are most commonly prescribed to compensate for undesirable refractive states, to compensate for poor eye alignment, and to compensate for presbyopic changes. These are crutches. Some crutches are more appropriate and necessary than others. Sometimes some degree of compensation is necessary, but it is often wrong to stop there since it is unlikely that there are no other (probably more important) visual deficiencies involved.

"Lenses change the orders to the system."

A.M. Skeffington, OD[1]

Are there other reasons to prescribe lenses? Lenses can be prescribed to prevent or remediate the same undesirable refractive states for which they are typically used to compensate. Of course, they can also be used to prevent or remediate strabismus, prevent or reduce visual stress, enhance visual performance and to protect, stimulate, enhance and guide visual development.

> **"It's not what a lens does to a person, but what a person does with a lens that matters."**
>
> Robert A. Kraskin, OD[2]

Perhaps lenses should be thought of as medicine. Definition: Medicine - n. 1. any substance, drug, or means used to cure disease or improve health. Most medicines have side effects, many of which require other medicines. Lenses designed solely as compensatory measures will likely have side effects of their own. Lenses are not for the eyes; they affect the brain, the body and behavior, so it might be best to put sufficient thought into their application.

> **"We feel that our vision is like a camera, but that is utterly wrong. Our brains aren't just seeing, they're actively constructing the visual scene and making decisions about it."**
>
> Dobromir Rahnev, psychologist Georgia Institute of Technology[3]

A recent study found that the superior colliculus may be contributing much more than previously thought. According to the study's senior author Massimo Scanziani, PhD, a professor of physiology at UCSF and a Howard Hughes Medical Institute investigator

"It's as if we've discovered a second primary visual cortex."[4] Based on this type of information, which has been more or less know to those practicing optometry from a behavioral/developmental perspective, we can and should be treating patients with this in mind, even when we think we are simply being asked to prescribe compensating devices.

Some basic assumptions:

- The primary purpose of the visual process is to direct action.
- The visual process is a holistic mind/body process
- The visual process is pervasive in human behavior.
- There is rarely a single "correct" Rx; there is typically a range of lenses that provide appropriate assistance.
- Most standard (compensating) prescriptions are stronger than necessary for their proposed use.
- Most standard prescriptions are inappropriate for the majority of the activities for which they are worn.
- The primary purpose of optometry is (or should be) to protect, support and direct development of the visual process.
- When confronted with any given individual statistics are, at best, useless.

Basic Prescribing Concepts:

- Prescribe for the person, not the measurements or the eye.
- Start at near and work from there.
- Prioritize prescribing for comfort, performance and development, not acuity
- Use balanced lenses whenever possible.
- Avoid prescribing or reduce cylinder whenever possible.
- Lenses derived strictly on distance acuity "needs" are likely to have undesired consequences.
- Consider a lens that allows the person to observe the natural fluctuations in acuity.
- One Rx is rarely good for all tasks.
    - Avoid prescribing only one Rx unless it's strictly therapeutic and therefore intended as a task-specific device.
- Compensating lenses should not be a first resort.
- If a person needs to adapt to the lenses it might be best to reconsider the Rx.

According to the AOA website, "The specific cause of astigmatism is unknown. It can be hereditary and is usually present from birth. It can change as a child grows and may decrease or worsen over time." My translation: We barely know why astigmatism is, and we really do not know what to do about it other than stick a lens

in front of it and cross our fingers. And really, we would prefer to not talk about it if that is okay with you.

"Astigmatism is very difficult to define."
"Astigmatism is difficult to understand."
A.M. Skeffington, OD[5]

In my experience…

- Almost everyone has some amount of astigmatism.
- Some people seem to need compensation.
- Many have compensating lenses but seem not to need them.
- Most have astigmatism and are asymptomatic.
- Astigmatism is easy to measure and prescribe.
- Doctors prefer to prescribe without talking about it.

Keep this in mind as we go through the following case:

> When determining criteria for a myopia study, Gwiazda also suggested allowing up to 1.5D of astigmatism. Mutti noted that the BLINK study allowed only up to 1D of astigmatism. "I regretted that decision a bit, because in recruitment we saw children not qualify with 1.03D of astigmatism," he said. "We had to turn away subjects eager to participate. I would say past 1.5D of astigmatism you're probably highly unlikely to get acceptable acuity," he continued.[6]

These folks clearly have not read Skeffington:

> Why does the person accepting only +0.25 spheres often find it more difficult to go without his lenses than does another person who is wearing +2.25 spheres? One person with 0.37 D astigmatism shows immediate results from the prescribing of that amount of cylinder. Why, then, does another with many times that amount maintain perfectly good acuity without a lens, and reject the cylinder if given as a lens formula? How does it happen that one myope with 20/100 acuity will attain 20/20 with a -0.50 and another will require -1.50 before 20/20 is possible? These are the problems which have plagued optometrists. The attempt to solve them by ignoring them, or to avoid them by attributing these reports to a neurosis or psychotic condition, is a failure.[7]

This is why, after removing a new patient's glasses from my lensometer at the start of an initial encounter, I prefer to tell them that their glasses have astigmatism. I think this is a better description of the situation, at least until we can determine the degree and nature of the situation as it regards the totality their visual profile and how that relates to their everyday needs.

> **"The optimal lens is not covariant with the refractive status of the eye but is determined by the clinical understanding of the problem."**
>
> A.M. Skeffington, OD[8]

Skeffington on astigmatism:

> **The number of patients who come because they lack acuity is relatively small. It would be interesting to have a percentage-wise study made by a few optometrists in practice as to how many of their patients come with a complaint of inadequate acuity, whose greatest need is cylinders.**
>
> **It is true that patients come with complaints of discomfort. The discovery is made that cylinders restore standard acuity. The prescription is written for the purpose of restoring acuity on the basis of cylinders, when the referring complaint is more often either that of discomfort or disability to complete work. The two are the same thing…**[9]

Prescribing lenses based solely on acuity often has less to do with the person who will be wearing the lenses than with the doctor prescribing them. Most lenses are designed to answer extremely myopic – if not astigmatic – testing, and not to maximize performance of activities of daily living - unless the patient is a professional eye chart reader.

> **"The value of the lens to the wearer is the change made in the output. True, there is a change in the input. However, this change brings about altered responses within the organism and so affects changes in the output. These output changes are the ones that lend significance to the use of lenses."**
>
> A.M. Skeffington, OD[10]

Sometimes a prescription is a means to an end and not an end unto itself. Lenses can promote a person's access to their brain's inherent plasticity. They can, and all too often do, the exact opposite.

When I first began presenting cases like this, colleagues would ask about the keratometry findings for patients like Ranya. I was not always in the habit of taking these findings. One reason, I suppose, was not wanting to let what I had been taught was an immutable, structural measurement interfere with my ability to entertain creative options for treatment. As you will see – and I hope believe – in this case, K-readings should not be taken as dogma. That is, just because the astigmatism appears to be structural in nature, does not mean it is etched in stone…or collagen, as the case may be. I have since made it a point to include K-readings, now that I know they will not dissuade me from my mission.

A Case In Point

Seven year-old Ranya was referred by another optometrist who told her parents that she had amblyopia and esotropia of the left eye. Her chief complaint was losing her place when reading. But that is not why I want to talk about this case. This is about lenses. More specifically – astigmatism.

Ranya had just gotten her first pair of glasses 18 months before coming to see me (September 2018). That Rx (January 2017) was OD +5.00 -1.00 x 180, OS +7.25 -0.75 x 180. The Rx was changed (December 2017) to OD +5.25 -1.25 x 180, OS +7.50 -1.25 x 180 less than a year later. Four months before I saw her (May 2018), she got a new Rx: OD +5.75 -2.00 x 180, OS +7.00 -1.75 x 180.

Here are my initial findings:

All testing done with SPRx (4 mos old)

K readings: OD -2.50 x 180 OS -2.50 x 180

DVA
PL: OU $20/50^{-1}$* OD $20/40^{-2}$ OS 20/70**
w/ Rx: OU $20/30^{-1\ +2}$ OD $20/30^{-1}$ OS $20/50^{-1+1}$

NVA
w/ Rx OU 20/16 @ 8" OD 20/30 @ 16" OS 20/40 @ 16"

*DVA at end of eval OU $20/30^{-1}$ w/ ***Plano***

OU $20/25^{-1}$ w/ Rx

**Right off the bat I am suspicious of her Rx since there is so little improvement in VA relative to the strength of the lenses.

Pursuits: 30% OU, OD, OS
Saccades: 90% undershoots; Z-axis = messy
NPC: TN

Retinoscopy
Distance: OD +1.50
OS Fluctuates
Near: OD +1.00 Fluctuates
OS +1.00 Fluctuates

Cover Test: w/ Rx D/N 4/2 w/ PL D/N 12/12 ET

Stereo: (+) GF 0" 0"Randot (-) Sup

6^ prism OD @ distance: Sup – except with BUOD

Red Lens NPC: R=OD – sup OS
R=OS – sup OD

Maddox Rod (near):
MR OD 3 R hyper 5eso
MR OS 2 R hyper 1eso

Again, all of this may or may not be particularly pertinent to what I want to get at, but perhaps the findings will help you get a better picture of Ranya.

My primary goal, of course, is to eliminate the presenting complaints and maximize Ranya's ability to use the visual process at the highest level possible. I have the luxury, in this case, to have Ranya as a visual training patient. However, it is important to look at her lenses as an integral part of the therapy process, and it is unlikely that her current lenses will have any positive influence on the desired outcome.

My experience has been that changing the habitual prescription is usually an important first step in any visual enhancement program. Since most prescriptions are based on acuity alone, they not only ignore any possible causes of reduced acuity, but generally exacerbate any underlying visual conditions. Compensating lenses are based on what has happened in the past and are unlikely to catalyze positive change going forward; in

fact they are likely to do just the opposite. I want to provide lenses that promote improved infrastructure on which to strengthen the visual process and set the stage for continued growth and development.

I wanted to get Ranya out of her current lenses and into something I thought would contribute to what I described above. She simply would not tolerate any change over several attempts. My preference would have been to go to equal spheres. Even a slight decrease in the cylinder was unacceptable to Ranya at her first visit, and several weeks later as well. I had it in my mind that I wanted to get her into +5.00 spheres OU, but due to her response to any modification, I decided to hold my breath (and my tongue) for a while.

Her parents were fully on board with what I was trying to do, and brought in a new frame at her second VT session. The frame sat in my training room for several weeks. During that time, I trial framed some modified lenses, to no avail. Any change got an immediate two thumbs down from Ranya. At week #6 I decided I could not wait any longer and dispensed a pair of +5.00 lenses. I asked Ranya to wear the new glasses whenever she could, knowing that she really did not like the way she saw with them. I was hoping she might ease into the new lenses, but was unsure how this would play out.

As an aside, when I shared this case with a colleague, it was suggested that the +5.00 was simply a spherical equivalent, and proof that such a formulaic approach works. While this may have been true for the right lens, this was strictly unintentional, as I have never purposely relied on spherical equivalence when modifying prescriptions.

Ranya returned the following week for VT, wearing her new glasses. Her father reported that she had worn them most of the previous week. At week #7 we measured the following:

DVA

w/ +5.00: OU $20/25^{-3}$ OD $20/25^{-3}$ OS $20/40^{-3}$

I only bring up acuities because this continues to be a major obstacle in my quest to inspire people to try something different when it comes to lenses. We are taught that maximizing acuity is a critical first step to a visual training program. I have not found this to be the case, as a rule.

Perhaps optimal acuity should be thought of as a result of a well-functioning visual process, not a prerequisite. I have found that vision therapy often leads to improved distance acuity. I think this is because the person becomes able to make better use of

the available information as the visual process becomes more sophisticated and effective as a result of visual training and/or a more strategic, dynamic use of lenses.

Lenses should, whenever possible, be used to help arrange conditions and provide opportunities for the system to change for the better. Lenses are not living up to their potential when all they are intended to do is carry out tasks that the organism is deemed unable to manage on its own.

We may be selling ourselves and our patients short by the continued insistence on prescribing lenses based strictly on acuity. Wearing lenses based solely on maximum distance acuity on a full-time basis is like wearing an insulated parka all year round because it gets very cold during certain times of the year.

In Closing…

Always try to provide the greatest benefit with the least amount of interference. Maximize the therapeutic aspects and minimize the compensatory aspects of any lens prescription. Try to impinge on the natural state as little as possible when compensating. Prescribe with an eye to the future, not the past.

> **"It is by logic that we prove, but by intuition that we discover."**
>
> Henri Poincaré[11]
>
> (French mathematician, theoretical physicist, engineer, and a philosopher of science - late 1800s to early 1900s)

> **"[W]e have to remember that what we observe is not nature in itself but nature exposed to our method of questioning."**[12]
>
> Werner Heisenberg
>
> (I think he was a physicist, but I'm uncertain)

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6. https://www.healio.com/optometry/pediatrics/news/print/primary-care-optometry-news/%7B6dcfdae6-f561-43a4-b96d-134aed913d96%7D/experts-debate-reach-consensus-on-parameters-for-myopia-control-trials

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