National Academy of Opticianry

Continuing Education Course

Use SOAP to Solve Eyewear Problems - Part 2

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Use SOAP to Solve Eyewear Problems - PART 2

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Course: Spectacle – 1 hour

Level: Basic to intermediate

Description:

This article is intended to expand the optician's knowledge and improve his/her ability to provide superior eye care.

Objectives:

Upon Completion of this program, the participant should be able to:

1. Determine the possible cause of the problem the patient is having with their glasses through having an in-depth knowledge of how to interpret the patient's complaints.

2. Have an understanding of accommodation and add power calculation and determination for specific working distances.

3. Have the knowledge and confidence to face patient complaints head-on and often resolve the patient's problems without the need for a return visit with the doctor.

NOTE: It is not the intention of the author to encourage opticians to step outside their scope of practice as determined by the licensing regulations of their State. This article is intended to expand the optician's knowledge and improve his/her ability to provide superior eye care. The author in no way promotes medical diagnoses being made by the optician. In addition, the optician should always discuss findings with the prescribing doctor prior to making any changes to the prescription.

Part one of this two-part program provided an introduction to the SOAP sheet and its use in resolving patient complaints with their glasses by getting to the root of the problem. The first two categories of the SOAP sheet – Subjective and Objective – were discussed in depth. The Manifest Refraction was discussed together with basic over-refraction techniques using a flipper. Ocular medical issues that can affect acuity were also discussed. Part 2 will cover the final two categories of the SOAP sheet - Assessment and Plan - and provide real patient examples with the steps taken to resolve their vision complaints.

A = Assessment

Interpretation of the Patient's Vision Complaints

Pulling Sensation
Can be related to:

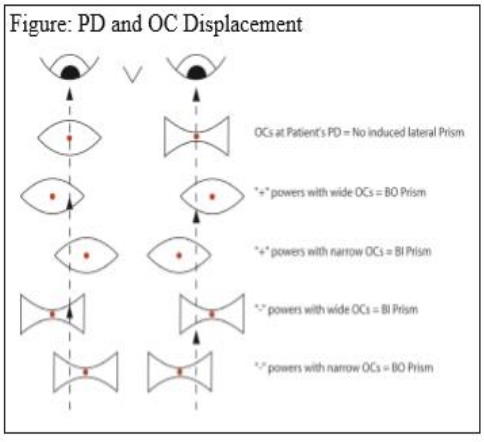
- PD or OC issues –
  - PD could have been measured incorrectly and ordered accordingly;
  - PD could have been measured correctly and ordered incorrectly – for example, a distance PD used instead of a near PD;
  - PD could have been measured and ordered correctly, but the lenses could have been made incorrectly.

NOTE: With a high-powered lens, even a small deviation from the required PD can create visual discomfort for the patient due to induced lateral prism. The amount of induced prism can be calculated using the Prentice Rule.

The Prentice Rule states: P = h x D

P = Prism
h = Distance from OC in cm
D = Lens power in relevant meridian

Examples using the Prentice Rule will be shown in detail in the section "Distortion of Objects" as part of the discussion on "Vertical Imbalance".



It is important to be aware of how a displaced OC relative to a patient's PD will affect the induced lateral prism:

Pulling Sensation (continued)

Can also be related to:

- Changes in base curve from the patient's previous eyewear:
  If a small change in prescription has taken place – less than 1 diopter – the base curve should be matched to the patient's previous eyewear. Base curve changes have always been a topic that creates great confusion. Often the doctor will request the optician "match the base curve" of the previous eyewear. Always matching the base curve of the previous eyewear can occasionally adversely affect the new eyewear. Rule of Thumb: If there is more than 1 diopter of change in prescription, it is best to have the lab compute the best base curve for the specific prescription. If there is less than 1 diopter of change, the base curve of the previous eyewear should be matched. In addition, if an aspheric lens is being used, it is once again recommended to let the lab compute the best base curve needed for the specific prescription. The benefits of the aspheric design can be diminished if the best base curve for the specific prescription is not used. When using digitally designed lenses, it is recommended to "trust" the computer program in its BC selection for the ordered prescription, in order to optimize its design and benefits.

- OC height - either not being specified or if pantoscopic tilt was not considered when measuring and ordering the OC height. NOTE: For every 2 degrees of pantoscopic tilt applied to the frame, the OC height must be dropped by 1mm.

- Face Form - the amount of face form, positive or negative, applied to the frame. Sunglass frames made on a + 8 base curve (BC) are notorious for causing visual discomfort (even in a plano sunglass with poor lens optics) unless "wrap compensation" is applied to the prescription when making prescription sunglasses. The same way pantoscopic tilt affects the vertical placement of the lens OC, positive face form affects its horizontal placement. When working with wrap eyewear using lenses with base curves in the +8 range, the effect on the lens OC is the same as applying positive face form. For this reason, when working with wrap eyewear, it is important the prescribed Rx be modified, resulting in a "wrap compensated Rx." When the patient wears the eyewear, the compensation corrects for power changes induced by the rotation of the lens around a vertical axis and the patient's vision is optimized. When neutralizing wrap eyewear made with a wrap compensated Rx, it should be positioned in the lensometer in the "As Worn" position, viewing through the lenses in the same way and through the same visual axis the patient will use when wearing them. When neutralized in this manner, the Rx obtained should match the original refraction. If the lens is placed flat against the lens stop through the lens OC and original visual axis, the Rx obtained should match the compensated Rx, often indicated on the lab invoice.

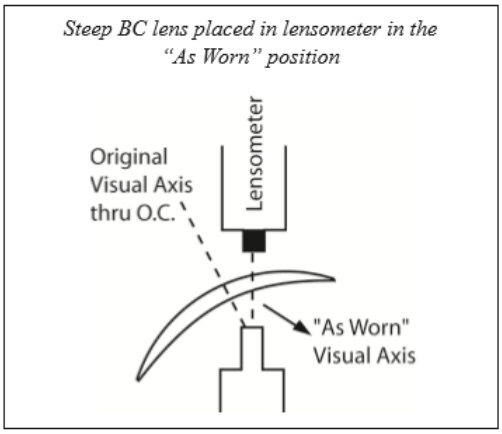
The compensation is based on "Martin's Formula for Lens Tilt":

$$\mathbf{D_{sph} = D(1 + \sin 2\ alpha/2n)}$$

$$\mathbf{D_{cyl} = D_{sph} \times \tan 2\ alpha}$$

Alpha = degrees of tilt
D = sphere power in the meridian of tilt
n = refractive index
D_{sph} = New sphere power
D_{cyl} = induced cylinder

The meridian of tilt is the one around which the tilt is applied: with wrap eyewear and positive face form - the 90th meridian; with pantoscopic tilt - the 180 meridian.



SIDE BAR: Examples of Wrap Compensated Rx

1) Original Refraction: -4.00 -2.00 x 180 Compensated Rx for frame with 20 degree wrap: -3.12 -2.50 x 125

2) Original Refraction: -4.00 -2.00 x 090 Compensated Rx for frame with 20 degree wrap: -3.25 -2.25 x 102

These modified prescriptions were computed by laboratory software for example purposes only.

Grinding this modified Rx gives the patient the original prescription when looking through the new visual axis created by the position of wear (POW).

Digital surfacing technology now makes the manufacturing of such precise prescriptions possible.

By lowering the OC 1mm for every 2 degrees of pantoscopic tilt, it removes the need to apply Martin's Formula. However, it is not recommended to modify the location of the OC in the horizontal meridian to compensate for positive, or negative face form because lateral prism would be induced.

With regards to prism, wrap eyewear will naturally induce Base Out (BO) prism, regardless of lens power. This induced prismatic effect will negatively impact visual acuity resulting in a "pulling sensation" affecting the patient's long-term visual comfort. Compensating for this BO prism with the addition of Base In (BI) prism will help optimize a patient's acuity and visual comfort. High-end sunglass manufacturers automatically compensate for such optical effects, even in their plano products. As they say, you get what you pay for!

Diplopia - monocular and binocular

If the patient complains of diplopia or double vision, ask them to cover one eye to determine if diplopia is still present. As discussed earlier, monocular diplopia can be related to many conditions, one of which is cataracts. If diplopia is still present with one eye occluded, refer to the doctor's notes from the exam for references to cataracts. Binocular diplopia can be caused by severe anisometropia or antimetropia. Both binocular and monocular diplopia can be caused by the patient looking through the ledge of a bifocal or trifocal segment – especially with the thick ledge of an executive (more noticeable with a lens material other than glass since glass

incorporates a fused design as opposed to having the ledge on the front of the lens in the case of a plastic molded lens). An AR coat can sometimes help reduce this visual complaint since occasionally this complaint can be aggravated by light scatter from the ledge of the segment. Sudden onset of binocular diplopia can also be a symptom of serious systemic disease, such as a brain tumor or aneurysm. The optician must be aware of all the possible causes for the particular complaint. If the optician is unable to resolve the diplopia by adjustment, the patient should be referred to the doctor.

Distortion of Objects

Visual discomfort due to the following can be presented by the patient as complaints of headaches, distortion of horizontal and/or vertical objects, or poor peripheral vision, to name a few.

- Warping due to sizing:
  Some patients experience visual discomfort from warping in a lens caused by incorrect sizing during the lens finishing process. A lens measuring one base curve horizontally and a different one vertically, or vice versa, was probably sized incorrectly during finishing and then squeezed into the frame.

- Material incompatibility:
  Some patients experience visual discomfort from certain lens materials such as high index materials, or polycarbonate. Aspheric designs can also create similar types of discomfort.

- Color dispersion:
  Patients will occasionally notice color dispersion, (white light being broken down into its components), from materials such as polycarbonate and high index plastics. This phenomenon is known as Chromatic Aberration which is exacerbated by reduced abbe values. The abbe or aberration value of a material is a measure of its dispersion of white light. There is an inverse relationship between refractive index and abbe value – materials with a higher refractive index have lower abbe values and greater dispersive qualities, making them more subject to exhibiting aberrations. This is one disadvantage of high refractive index materials.

- Objects shifting with lined multifocals:
  Patients with anisometropia or antimetropia can often experience vertical imbalance if their multifocal lenses have been made without slab off prism. Vertical imbalance can be induced when a patient uses a multifocal lens as their line of sight shifts away from the optical center of the lens to look through the segment of the multifocal. When there is a power difference greater than 1.5D between each eye in the 90th (vertical) meridian, the induced imbalance can cause visual discomfort for the patient and make near work difficult.

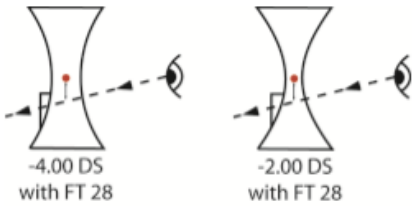
Vertical Imbalance

Vertical imbalance results from the induced prismatic effect.

The Prentice Rule, as stated earlier, can be used to calculate

the amount of prism induced:

P = h x D



Assuming 10mm (or 1cm) from the OC of lens to the point viewed through for near work:

OD: Prism = 10mm (or 1cm) x 4 = 4 prism diopters and since the lens is "minus," the prism is Base Down (BD)

OS: Prism = 10mm (or 1cm) x 2 = 2 prism diopters and once again is Base Down (BD)

Vertical Imbalance = 4 prism diopters BD – 2 prism diopters BD = 2 prism diopters of total imbalance

This would make stereopsis at near difficult for the patient

One method used to compensate for this imbalance is to incorporate "Slab Off" prism, also referred to as "Bicentric Grinding." Alternatively, "Reverse Slab Off" prism can be utilized.

Slab off, or Bicentric Grinding, is Base Up prism ground to offset the excessive Base Down prism induced and is applied to the least plus, or most minus lens. Reverse slab off is molded Base Down prism which offsets the excessive Base Up prism induced. Reverse Slab Off is applied to the most plus, or least minus lens. Both Slab off and Reverse slab off achieve the same objective - resolving visual discomfort due to vertical imbalance.

So, 2 diopters of slab off prism should be applied to the OD lens to neutralize the resultant vertical imbalance, or 2 diopters of reverse slab off to the OS.

It should be noted that vertical imbalance is independent of the add power of the multifocal and only affected by the power in the 90th meridian and the distance from the lens OC to the point in the lens viewed through for near work – assumed to be 10mm as a standard for calculation purposes. Good binocular vision is necessary for patients to experience vertical imbalance; patients with reduced acuities in one of their eyes will generally not be affected by this condition.

- Depth perception issues: Patients receiving glasses for the first time, or receiving glasses with a dramatic change in prescription will often require an adaptation period to get used to the different sized images the eyes are receiving compared to what the brain is used to seeing as "real." In addition, a patient with anisometropia or antimetropia will often have initial, if not long-term problems with stereopsis and depth perception. Keeping the lens thickness and vertex distance to a minimum will help minimize image disparity as much as possible.

P = Plan

Step 6: Evaluate the information acquired and consult with the prescribing doctor to discuss your findings. The doctor will then decide whether or not they wish to re-refract the patient, or simply incorporate the changes based

on the optician's report. Note: Some patients, especially the elderly, regardless of whether the acuities they are getting may be the best possible, need to hear this directly from the doctor.

Patient Examples

1. **S:** 38 year old female presented with headaches and experiencing a swimming sensation after wearing her new prescription for more than 30 minutes.

   O: Time since dispense: 5 days.
   Prescription verifies as ordered except for PD and Prism – should be 1BO OD.
   Verification:
   -3.25 DS 3/4BO Prism OD
   -3.25 -0.50 x 034
   PD ordered 30mm OU, received 32/30

   BC: OD: vertical +3.25, horizontal +3.25
   OS: vertical +3.25, horizontal +4.00

   Patient's previous prescription:
   -3.00 DS 1BO Prism OD
   -3.00 DS
   BC: OD: vertical +3.00, horizontal +6.00
   OS: vertical +5.00, horizontal +5.00

   A: Minor change in Rx. Warping worse in old glasses than new. PD off 2mm OD = 0.2cm.

   Induced prism caused by incorrect PD received: using the Prentice Rule calculates as:
   P = hD = .2 x 3.25 = .65 Prism Diopters

   The PD is wide on a minus lens and therefore the prism is Base In.

   P: Rx check with doctor. Re-make glasses on the closest BC available to a +4.50 (an average from the patient's old glasses) ensure no warping during finishing and perfect PDs.
   Result: during Rx check with doctor, Rx was re-written as :
   -3.00DS 1BO
   -3.00 – 0.25 x 040

   Glasses were remade and verified exactly as ordered, no warping and perfect PDs. Patient immediately noticed an improvement at dispense.

2. **S:** 50 year old female presented with distance and near problems with her new progressives.

O: Time since dispense: 15 days
Prescription verifies as:

Pl -0.62 x 037	Add: +1.62
+1.25 -0.50 x 141	Add: +1.62

Ordered as:

-0.25 -0.50 x 037	Add: +1.75
+1.25 -0.50 x 137	Add: +1.75

Previous Rx: OTC +2.50 readers

PDs and seg heights verify as ordered.

A: Patient tilts head down to improve distance marginally, but not a great improvement.

OD off by -0.25DS and add power only measuring +1.62 OU probably due to shape of frame cutting off part of the add – steep nasal cut and seg fit at minimum necessary for progressive selected.

Referring to exam info:

- Patient had no initial complaints with distance, just difficulties at near;
- OS congenital amblyopia – BCVA 20/50+2, OD BCVA 20/20-1;
- History of a retinal tear OD more than 10 years ago and patient reported a concussion in 2009 resulting in a noticeable change in vision.
- Amblyopia OS possibly contributing to adaptation problems with progressives.
- Anisometropia probably not a contributing factor due to reduced acuities OS.
- Otherwise an unremarkable medical history.

Increased pantoscopic tilt improves the distance by an inadequate amount. *NOTE: Patient now requests single vision readers only.*

Trial lens over-refraction (O/R) at near point +0.25/+0.50 OU – patient likes +0.50 OU. Near is much improved.

Trial frame full prescription to confirm:

OD +2.00 -0.50 x 037
OS +3.50 -0.50 x 137

Patient likes trial frame powers for near.

P: Discuss findings with doctor and recommend remaking glasses as single vision readers.

Doctor okayed single vision readers re-made to new Rx. At dispense, patient happy with vision and absence of progressive.

3. **S:** 58 year old female presents with distance problems wearing her new progressives – near is good.

O: Time since dispense: 7 days
Rx verifies as ordered:

+2.50 -0.75 x 090	Add: +2.50
+2.25 -0.75 x 085	Add: +2.50

Previous Rx verifies as:

+2.25 -0.75 x 097	Add: +2.25
+2.00 -0.75 x 088	Add: +2.25

A: No improvement in distance with lowering of chin. Patient used her own frame for new lenses, and segment height and PD verifies as ordered, and matches the previous lenses. Progressive lens style also matches the patient's previous lenses. Minor change in prescription +0.25 OU in distance combined with +0.25 increase in add power OU.

Trial lens O/R with +/- 0.25 over distance. Patient likes -0.25 much better. Reverting patient's Rx back to old distance powers.

P: Discuss findings with doctor and recommend Rx change to:

+2.25 -0.75 x 090	Add +2.50
+2.00 -0.75 x 085	Add +2.50

Doctor agreed with recommended Rx change. Re-make glasses to new Rx. Patient liked vision from the revised Rx.

Note: In two out of the three above situations, the patient's complaint was resolved by the optician without the need for a return visit with the doctor.

SIDE BAR*: Accommodation and Add Power Determination*

Accommodative ability is a measure of how much a patient can accommodate (increase the converging power of the crystalline lens to focus up close). The patient's add power is determined by factoring in how much accommodative ability the patient has and supplementing it with additional power in the glasses to equal the accommodation necessary to work at the required working distance. The doctor will typically prescribe an add power that allows for the patient to use some of their accommodative ability. Patients over approximately 65 years of age and patients who have had cataract surgery have no accommodative ability, in which case all the focusing power needed will be provided by the glasses.

The standard working distance for near is 40cm, or 16 inches, and an emmetropic patient would need to apply 2.50D of accommodation to focus at this distance.

SIDE BAR continued

This is calculated as follows:

Working Distance (WD) in meters = 40cm = 0.4m

Power = 1 / focal length (or WD) in meters = 1 / 0.4 = 2.50D

If the patient requested their near working distance to be 80cm = 0.8m

Power = 1 / 0.8 = 1.25D

Note: WD is twice the standard and the accommodation needed at that increased distance for an emmetropic eye is half the standard. This is an inverse linear relationship.

This knowledge can be used to determine the add power needed at any working distance providing the add power is known for a specified distance.

Example 1:

The doctor has written a prescription with a +2.00 add power, which we know will allow the patient to work at 40cm, or 16 inches. The patient wants to work at the computer which is 32 inches away, or 80cm.

We know the relationship between WD and add power is inversely linear:

Therefore, if we double the WD, we need to halve the add power.

Thus, the add power needed for 80cm would be +1.00.

Things become a little more difficult when dealing with adds such as +2.25 where half would equal +1.12D which is an impractical add power. In such a scenario, is it better to give the patient a +1.00, or a +1.25 add? The safest way to determine this is by asking the doctor. Their knowledge of the patient's performance in the exam and the patient's accommodative ability will help the doctor make this determination.

Example 2:

The doctor has determined a +2.00 add will allow the patient to work at 16 inches or 40cm. The patient is requesting a pair of music glasses to work at 25inches.

25 inches = 62.5 cm = 0.625m

There is a mathematical way of precisely calculating the add power needed, but there is a much easier way:

62.5cm is a little more than halfway between 40cm and 80cm.

We know:

A WD of 40cm would require a +2.00 add

A WD of 80cm would require a +1.00 add

SIDE BAR continued

Therefore…

A +1.25 add would give a WD of 70cm

A +1.75 add would give a WD of 50cm

So, a WD of 60cm would require a +1.50 Add – the closest add available for the WD required.

Having these problem solving tips will help the optician and the doctor get to the root of the problem more efficiently. It expands the role of the optician as an eye care professional and also demonstrates his/her advanced knowledge to the patient. The optician being skilled in these problem solving techniques serves multiple needs:

- it elevates the position of the optician as a valuable and knowledgeable member of the eye care team;
- it is an opportunity for the patient's complaints to be resolved without having to schedule a return visit with the doctor;
- it opens up an appointment slot for a billable patient instead of a no-charge, prescription re-check.

Do opticians dread hearing complaints? Of course. . . who doesn't? However, such incidents should also be embraced as a challenge and an opportunity to learn and grow as an eye care provider.

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