INTRODUCTION TO BINOCULAR VISION TESTING: LECTURE 2

Dr Hilary Gaiser OD, MSc
Assistant Professor of Optometry
New England College of Optometry

This presentation has been created for Orbis International trainees by New England College of Optometry Volunteer Faculty.

This presentation is property of the New England College of Optometry and any attempt to reproduce material will be in violation of US copyright law.
ACKNOWLEDGEMENTS

Thank you to the Orbis team for the opportunity to present these lectures to the international eye care provider community. Additional thanks to Dr. Sarah Wassnig OD for her guidance and support and to Dr. Catherine Johnson OD for her sharing her binocular vision training material to aid in the making of these lecture slides.
LECTURE OBJECTIVES

• Identify the compensating vergence for all types of phorias and predict if a patient is likely to be symptomatic based on Sheard’s criterion

• Predict the effect of an Rx on ocular alignment using the AC/A ratio

• Calculate Amps when the amp is measured through something other than the best distance refraction

• Duane White and accommodative diagnoses
  • When provided with cases, classify into Duane White/accommodative diagnoses
  • Predict findings if given the Duane White or accommodative diagnosis
PHORIAS AND VERGENCE REVIEW

• Everyone has a phoria that has the potential to become symptomatic, or to develop into a tropia (decompensated phoria)

• What prevents a phoria from becoming symptomatic or decompensating into a tropia?
  – Balance between fusional supply and demand
  – Fusional demand: phoria at a given working distance
  – Fusional supply: fusional vergence ability (accommodative vergence can also add to the supply)
COMPENSATING FUSIONAL VERGENCE REVIEW

• Positive fusional vergence (PFV) *compensates* for Exophoria
  – PFV = convergence (tested with BO prism)

• Negative fusional vergence (NFV) *compensates* for Esophoria
  – NFV = divergence (tested with BI prism)

• Even patients with orthophoria need a supply of fusional vergence to function comfortably

• Always compare phoria and vergences that are measured:
  - At the same working distance
  - Through the same prescription
  - Consider norms and guidelines
NORMATIVE DATA REVIEW

<table>
<thead>
<tr>
<th>Phoria, AC/A and Vergence Norms</th>
<th>BLUR</th>
<th>BREAK</th>
<th>RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance Horizontal Phoria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near Horizontal Phoria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance Vertical Phoria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near Vertical Phoria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 esophoria to 3 exophoria</td>
<td>Ortho to 6 exophoria</td>
<td>Ortho</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>BLUR</th>
<th>BREAK</th>
<th>RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance Positive Fusional Vergence</td>
<td>9 +/- 4</td>
<td>19 +/- 8</td>
<td>10 +/- 4</td>
</tr>
<tr>
<td>Distance Negative Fusional Vergence</td>
<td>x</td>
<td>7 +/- 3</td>
<td>4 +/- 2</td>
</tr>
<tr>
<td>Near Positive Fusional Vergence</td>
<td>17 +/- 5</td>
<td>21 +/- 6</td>
<td>11 +/- 7</td>
</tr>
<tr>
<td>Near Negative Fusional Vergence</td>
<td>13 +/- 4</td>
<td>21 +/- 4</td>
<td>13 +/- 5</td>
</tr>
<tr>
<td>Distance &amp; Near Vertical Fusional Vergence</td>
<td>x</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

*For vergences, bigger ranges are normal and smaller ranges are abnormal*

Near Point of Convergence | 5cm/7cm (acc), 7cm/10cm (light)

Adapted from Morgan’s Table of Expected Findings, Scheiman & Wick 3rd Ed.
• Sheard’s Criterion: Compensating fusional vergence should be at least two times the phoria for comfortable single vision

• The blur finding (can use break if no blur) is used as the compensating vergence number to compare to the phoria
  – If the BO to blur ≥ 2 x exophoria → predict comfortable single vision
  – If the BI to blur ≥ 2 x esophoria → predict comfortable single vision
SHEARD’S CRITERION ANALYSIS

Example 1:

Cover test (without correction): 2 prism diopter exophoria at Distance & 9 prism diopter exophoria at Near

Step vergences (without correction): near BI x/20/18 & near BO 24/30/26

- Is the phoria within the normal range? No
- Which is the compensating fusional vergence for Exophoria? BO
- Is Sheard’s Criterion met? Yes
- Would you predict this patient to be symptomatic based on Sheard’s criterion? Most likely no
Example 2:

Cover test (without correction): 2 prism diopter exophoria at Distance & 9 prism diopter exophoria at near

Step Vergences (without correction): NBI x/20/18  NBO 11/13/7

- Is Sheard’s Criterion met?  No
- Would you predict this patient to be symptomatic based on Sheard’s criterion? Most likely yes
AC/A RATIO REVIEW

**Accommodative Convergence / Accommodation**

- **Purpose:**
  - To determine the change in accommodative convergence that occurs when the patient increases or decreases accommodation by a given amount
  - ie. How strong is the link between accommodation and convergence?

- Measure the patient’s phoria and then re-measure with +/- 1.00 flippers and assess how the phoria position changes
Example 1

Refraction: -2.00 OD and OS

Cover test through -2.00 OU (habitual): 4 exo

Cover test through +1.00 OU: 8 exo

AC/A Ratio = 4/1

Convergence decreased by 4 prism diopters when the stimulus to accommodation was decreased by +1.00 D
AC/A RATIO: NORMS REVIEW

- Normal: 4/1 to 6/1
- Low: < 4/1
- High: > 6/1
CLINICAL APPLICATION OF AC/A RATIO

• Abnormal AC/A often associated with a functional BV anomaly (or certain types of strabismus ie. accommodative esotropia)

• AC/A value predicts the effect of Rx on patient’s alignment
  – Can help decide what to Rx

• For asymptomatic patients who present with a normal phoria:
  – When AC/A is high, re-check phoria with new Rx to make sure you are not making phoria symptomatic
  – Can also take advantage of a high AC/A ratio depending on Rx

  – Especially important for:
    • Esophorias when prescribing minus (minus stimulates convergence)
    • Exophorias when prescribing plus (plus relaxes convergence)
AC/A & PRESCRIBING

Example 1:

Cover test (uncorrected): 6 prism diopter esophoria at near
AC/A: 8/1

Predict:
• Phoria through +1.00 OU at near?  2 exophoria

• Phoria through +2.00 at near?  10 exophoria

• Need to be mindful of prescribing minus (makes esophoria worse)
AC/A & PRESCRIBING

Example 2:

Cover test (uncorrected): 6 prism diopter esophoria at near
AC/A ratio: 3/1

Predict:
• Phoria through +1.00 OU at near? 3 eso
• Phoria through +2.00 at near? Ortho
• Be mindful that plus will help the patient
AMPLITUDE OF ACCOMMODATION REVIEW

• Purpose: measuring (diopters) the change in focus in response to near stimulus

• Tested under monocular conditions

• Remember to record the first sustained blur (cm → diopters)

• Use an accommodative target that is 1-2 lines larger than BCVA

• Performed through the patient’s habitual correction but can retest through any large changes in prescription
  – Note only measuring the true Amps if using the correct Rx
  – Use true Amps to make decisions about accommodative anomalies
  – Must indicate the Rx through which you are testing
AMPLITUDE OF ACCOMMODATION ANALYSIS

• Amp for OD and OS usually the same, as long as refractive error is equally corrected

• Ex 1. sustained blur = 10 cm; Amp = 100/10 = 10 D

• The Rx through which the Amp is measured affects the Amp measurement
  - Under-corrected myopia → over estimates Amps
  - Under-corrected hyperopia → under estimates Amps
  - Patient wearing an Add → over estimates Amps
  - Potential accommodative disorder
Example 1:

Habitual Rx: -2.00
  Measured Amp through -2.00 = 5 D
  Today’s distance refraction: -3.00
  Estimated Amp through -3.00 = 5 – 1 = 4 D

Example 2:
  Habitual Rx: +1.00
  Measured Amp through +1.00 = 6 D
  Today’s distance refraction: +3.00
  Estimated Amp through +3.00 = 6 + 2 = 8 D
CLASSIFICATION OF FUNCTIONAL BINOCULAR VISION ANOMALIES
BINOCULAR VISION ANOMALY REVIEW

• Non-strabismic binocular vision anomalies (or ‘decompensated phorias’) AND accommodative anomalies

• Common, affect children and adults

• Non-pathological, non-sight threatening but can have significant impact on quality of life

• Highly recommended to do a full dilated fundus exam to rule out any ocular pathology

• Must start out with an updated spectacle prescription
COMMON FUNCTIONAL BINOCULAR VISION ANOMALIES

- Convergence insufficiency (CI)
  - Pseudo-Convergence insufficiency
- Convergence excess (CE)
- Divergence insufficiency (DI)
- Divergence excess (DE)
- Basic exophoria
- Basic esophoria
- Accommodative Insufficiency (AI)
- Accommodative Excess (AE)
- Accommodative Infacility
DUANE-WHITE CLASSIFICATION

Pros:
• Common approach to classifying vergence anomalies
  – Allows you to classify binocular anomalies based on phoria at distance and near and AC/A ratio
  – Can then confirm the diagnosis by evaluating compensating vergence, accommodation and interactions between vergence and accommodation
• We will also discuss accommodative anomalies

Cons:
• Does not address vertical anomalies
• Can be simplistic, in practice there is frequently an overlap in conditions or binocular vision disorders do not fall cleanly into these categories (other classification systems exist)
DUANE-WHITE CLASSIFICATION

• Breaks down findings into convergence or divergence problems & excess or insufficiency findings

• Convergence problems are typically associated with abnormal near findings (focus on near testing)

• Divergence problems are associated with abnormal distance findings (focus on distance testing)

• High AC/A → excess
• Low AC/A → insufficiency
Is phoria greater at distance or near?

N > D by at least 5 pd
Convergence problem

D > N by at least 5 pd
Divergence problem

D = N
Basic

Eso
High AC/A
CE

Exo
Low AC/A
CI

Eso
Low AC/A
DI

Exo
High AC/A
DE

Eso
Basic

Exo
Basic

Thank you to Dr. Catherine Johnson OD for reproduction and use of this flow chart.
DUANE-WHITE CLASSIFICATION

• Compensating vergences are low in excesses and insufficiencies
  – Exophorias are associated with low positive fusional vergence
  – Esophorias are associated with low negative fusional vergence

• High compensating vergences are NOT a problem
REVIEW OF TESTING CONCEPTS

• Tests of negative fusional vergence
  – Base-in step prisms (distance or near)

• Tests of positive fusional vergence
  – Near point of convergence
  – Base-out step prisms (distance or near)
BINOCULAR & MONOCULAR ACCOMMODATIVE FACILITY TESTING

• Testing procedure:
  – Count cycles per minute (cpm) of flips between +/- 2.00 D flippers at 40 cm (cycle counts and + and – side)
  – Instruct patient to report when the target clears
  – Use a line of letters 1-2 lines larger than best corrected near visual acuity
  – Normative data: 8-12 yo: BAF 5 cpm +/-2.5
  – Normative data: 18-35 yo: MAF 11 +/- 6 & BAF 9 +/- 4
  – Can use 8 cpm +/- 2
  - Also note if one side or the other is slower

• Helps to differentiate between vergence and accommodative problems
  – If low facility on both binocular and monocular facility → likely an accommodative problem
  – If low facility on only binocular but not monocular→ vergence problem

CONVERGENCE INSUFFICIENCY (CI)

**Symptoms**
- Near point complaints
  - Asthenopia
  - Intermittent blur/diplopia
  - Burning and tearing
- Reading difficulty
  - Words move on page
  - Difficulty concentrating
  - Sleepiness when reading
  - Slow reader
- Bilateral frontal headaches
- Worse at end of day

**Clinical Signs**
- Exophoria near > distance
- Low AC/A ratio
  - May break down into an intermittent exotropia
- Receded near point of convergence
  - More receded with red glass
  - More receded with repetition
- Low on tests of positive fusional vergence at near
  - Low base out at near
  - Fails binocular accommodative facility (BAF)
  - Trouble with plus flippers
- Often with accommodative insufficiency (AI) or accommodative excess (AE)
CONVERGENCE EXCESS (CE)

Symptoms
• Near point complaints
  – Asthenopia
  – Intermittent blur/diplopia
  – Burning and tearing

• Reading difficulty
  – Words move on page
  – Difficulty concentrating
  – Sleepiness when reading
  – Slow reader

• Bilateral frontal headaches
• Worse at end of day
*Same as convergence insufficiency (CI)

Clinical Signs
• Esophoria near > distance, high AC/A ratio

• Normal near point of convergence

• Low on tests of negative fusional vergence
  – Low base in prism (near)
  – Fails binocular accommodative facility (BAF)
  – Trouble with minus flippers

• Often presents with an accommodative excess
DIVERGENCE INSUFFICIENCY (DI)

**Symptoms**
- Distance complaints
  - Asthenopia
  - Intermittent blur/diplopia
- Often worse during night driving
- Motion sickness
- Worse at end of day

**Clinical Signs**
- Esophoria distance > near
- Low AC/A ratio
- Normal near point of convergence
- Low negative fusional vergence at distance
  - Low base in (distance)
DIVERGENCE EXCESS (DE)

**Symptoms**
- Few complaints
  - Asthenopia rare unless also an associated accommodative dysfunction
  - Diplopia rare due to suppression
- Photophobia; may close one eye in bright light
- Cosmesis

**Clinical Signs**
- Exophoria distance > near
- High AC/A ratio
- Often large exotropia when looking very far away
  - Can be associated with V pattern exo
  - Normal near point of convergence
- Low positive fusional vergence at distance
  - Low base out (distance
Thank you to Dr. Catherine Johnson for sharing her photo material
**BASIC EXOPHORIA**

**Symptoms**
- Combination of convergence insufficiency and divergence excess symptoms
- “Exo” symptoms at both distance and near

**Clinical Signs**
- Exophoria distance = near (within 5 prism diopters)
- Receded near point of convergence
- Low positive fusional vergence at distance and near
  - Low base out vergences (distance & near)
  - Fails BAF
  - Trouble with plus flippers
BASIC ESOPHORIA

Symptoms

- Combination of convergence excess and divergence insufficiency symptoms
- “Eso” symptoms at distance and near

Clinical Signs

- Esophoria distance = near (within 5 prism diopters)
- Normal near point of convergence
- Low negative fusional vergence at distance and near
  - Low base in vergences (distance and near)
  - Fails BAF
  - Difficulty with minus flippers
ACCOMMODATIVE INSUFFICIENCY (AI)

Symptoms
• Blur and/or asthenopia at near

Clinical Signs
• Low amplitude of accommodation (Amps)

• Fail minus lenses on BAF and MAF

• Esophoria at near
PSEUDO-CONVERGENCE INSUFFICIENCY

• **Exophoria near> distance and near point of convergence receded but near point of convergence and alignment improve with plus (+) lenses**

• Low (+) lenses give the accommodative system a ‘kick start’ → ‘paradoxical’ activation of accommodation

• Stimulates accommodative convergence → reduces demand on fusional vergence → reduces exophoria

• **Root of the problem is accommodative insufficiency**

• Whenever you suspect convergence insufficiency based on cover test and near point of convergence, make sure to re-test through +1.00 to rule out pseudo-convergence insufficiency (Accommodative insufficiency)
ACCOMMODATIVE EXCESS (AE)

Symptoms

- Distance blur especially after near work
- Asthenopia and/or headaches with near tasks

Clinical Signs

- Variable visual acuity, ret and refraction
  - “Pseudo-myopia”
- High Amps
- Fails BAF and MAF
- Trouble clearing plus on flippers
- Esophoria at near and possibly distance
ACCOMMODATIVE INFACILITY

Symptoms

• Difficulty shifting focus from distance to near and vice versa

• Asthenopia associated with near tasks

• Difficulty with reading

• Intermittent blur associated with near tasks

Signs

• Fails BAF and MAF

• Trouble with both plus and minus lenses
PATIENT CASES
OVERVIEW OF CASES

• History
• Entrance testing
  • Refraction
• Additional BV testing
  • Diagnosis
• Take home points
CASE 1

25 y/o F presents for an eye exam with the chief complaint (CC) of blur and eye strain.

History of present illness (HPI): Intermittent and typically starts after 1 hour of computer work. The patient reports it is in both eyes and is constant as the patient recently switched to a desk job. The patient reports occasional, horizontal double vision when tired and while reading and she finds relief after taking a break. The patient does not currently use glasses and she is worried about job performance.
CASE 1 – ENTRANCE TESTING

- DVAsc: 20/20 OD and OS
- NVAsc: 20/20 OD and OS
- CTsc: ortho at D, 10 XP at N
- EOMs: safe
- Push-up Amp sc: OD 10D, OS 10D
- NPCsc (acc): 15cm/25cm
- Stereo sc: 20 sec arc at 40cm
- Pupils: ERL, no RAPD
CASE 1 – REFRACTION

Subjective refraction:

OD plano 20/20 D & N
OS plano 20/20 D & N
OU: 20/20 D & N
CASE 1: ADDITIONAL TESTING

- Cover test (without correction): ortho at D, 10 exophoria at near
- Repeat cover test (without correction) +1.00 OU: 12 exophoria

- AC/A ratio: 2:1

- Step vergences: Near Base-Out uncorrected: 6/18/4, Near Base In uncorrected: 8/10/7

- Is Sheard’s criterion met? No, patient will likely be symptomatic

- Patient has difficulty on the (+) side of flippers on BAF & MAF

- Patient fails binocular accommodative facility and not monocular accommodative facility
POLL QUESTION 1

• What is your diagnosis for this patient?

• 1) Pseudo-convergence insufficiency

• 2) Convergence insufficiency

• 3) Accommodative insufficiency

• 4) Basic exophoria
ANALYSIS

Convergence insufficiency

- Large exophoria and receded near point of convergence, low AC/A, low on tests of positive fusional vergence, (+) flippers

- Amps are normal

- Pt.’s findings do not improve with plus so can rule out pseudo-convergence insufficiency/accommodative insufficiency
CASE 2 - HISTORY

16 y/o F presents for comprehensive eye exam with chief complaint (cc) of tired eyes when reading.

HPI: Pt reports symptoms almost every day since the beginning of the school year and that it occurs in both eyes. The patient reports symptoms are worse at the end of the day and that she tends to re-read sentences. She wears glasses full-time and her symptoms improve after taking breaks. She is concerned about school performance.

Lensometry: -2.25 sph OD and OS
CASE 2 – ENTRANCE TESTING

- **DVAcc**: 20/20 OD and OS
- **NVAcc**: 20/20 OD and OS
- **CTcc**: ortho at D, 10 exophoria at near
- **Push-up Amp cc**: 13 D OD, 13 D OS
- **EOMS**: Smooth, accurate, full and extensive
- **NPCcc**: 14cm/16cm (light), 16cm/18cm (red lens)
- **Pupils**: ERRL, no RAPD
- **Stereo cc**: 40 sec arc @ 40cm
CASE 2 – REFRACTION

Refraction:

OD -2.25 20/20
OS -2.25 20/20
Case 2- Additional Testing

- CTcc: ortho at D, 10 exophoria at near
- Repeat cover test with +1.00 flippers: 5 exophoria

- Is the AC/A ratio really 5/1? This does not make sense

- The exophoria got better with plus flippers over the habitual Rx
  - Lensometry: -2.25 sph OD and OS

- Repeat near point of convergence with +1.00 over habitual Rx
  - 5cm/6cm (near point of convergence improved from 14 cm/16 cm to 5cm/6cm)
  - This also does not make sense
POLL QUESTION 2

• What is your diagnosis?

  • 1) Accommodative excess
  • 2) Convergence insufficiency
  • 3) Accommodative insufficiency/pseudo CI
  • 4) Divergence excess
CASE 2 – **DIAGNOSIS**

Pseudo-CI (accommodative insufficiency)

- Always note the effect of (+) when suspect CI → PSEUDO-CI if phoria and NPC better through (+)

- Would consider prescribing +1.00 Add for near
11 y/o female presents for her first comprehensive eye exam with the CC of being referred after a school screening due to decreased visual acuity; tends to squint when looking at details, especially far away.

HPI: Pt reports that it is daily and that it started at the end of last school year. The patient reports that it is in both eyes and lasts all day. The patient reports no headaches or double vision, denies distance or near blur and is finding no relief. The patient’s mother reports that she is struggling in school.
CASE 3 – ENTRANCE TESTING

DVAsc: 20/50- OD, 20/50- OS  
NVAsc: 20/20 OD and OS

CTsc: 3 prism diopter exophoria at distance and 14 prism diopter exophoria at near
Push-up Amp sc: 17 D OD, 17 D OS

EOMS: SAFE

NPCsc (light): 10cm/15cm

Stereo sc: 30 sec arc at 40cm

Pupils: ERRL, no RAPD
CASE 3 - REFRACTION

Subjective refraction:

OD -1.25 sph 20/20
OS -1.25 sph 20/20
CASE 3 – ADDITIONAL TESTING

Trial framed Rx (-1.25 OD and OS)

Cover test through trial frame: 4 exophoria at 40cm
Previous cover test: 14 prism diopter exophoria at near

Near point of convergence through trial frame (light): 2cm/4cm & previous NPC (light): 10cm/15cm

Exo and NPC improved!
AC/A ratio?
~ 8/1 (14xp sc @N to 4 exo)

Can take advantage of a high AC/A ratio to help with large exophoria
POLL QUESTION 3

What is your diagnosis?

1) Convergence insufficiency

2) Divergence excess

3) Accommodative insufficiency

4) Incorrect glasses prescription
Large exophoria secondary to uncorrected myopia; exophoria/convergence within normal limits with correction

- Uncorrected myopia can be associated with exophoria

- Correct significant refractive error before proceeding with testing

- Take advantage of high AC/A to promote alignment when prescribing
CASE 3 – PART 2 ANALYSIS

Push-up Amp SC was 17 D OD and OS

*What would you predict the Amp to be if you had measured it through -1.25 OU?*

Amp (through -1.25) = 17 – 1.25 = 15.75 D (approx 16 D)
CASE 4 - HISTORY

23 y/o black, male, optometry student presents for a comprehensive exam with the chief complaint of eye strain when studying and blurry vision at distance after studying.

HPI: The patient reports that he experiences the blurry vision multiple times per week while studying and that his symptoms have been worse since starting optometry school. He reports that the blurry vision is in both eyes and it is worse at the end of the day. The patient reports no associated symptoms but he does report that his symptoms are relieved with breaks. The patient reports that he is having trouble studying for his classes and he is worried about his grades.
CASE 4 – ENTRANCE TESTING

- DVAsc: 20/30 OD and OS
- NVAsc: 20/20 OD and OS
- CTsc: ortho at distance, 5 esophoria at near
- Push-up Amp sc: 12 D OD, 12 D OS
- EOMS: safe
- NPCsc (light): TTN
- Stereo: 30 sec arc at 40cm
- FCF: full OD, full OS
- Pupils: ERRL, no RAPD
CASE 4 - REFRACTION

• Retinoscopy:
  OD -1.00-0.75x090
  OS -1.00-0.50x090

• Subjective refraction after delayed refraction/cycloplegic refraction
  OD plano 20/20
  OS +0.25-0.25x180 20/20
CASE 4 – ADDITIONAL TESTING

- CTsc: ortho at distance, 5 esophoria at near
- Repeat cover test through -1.00 OU 13 esophoria

- AC/A ratio 8/1 (abnormal finding)

- Step vergences: near base in uncorrected x/8/6 & near base out uncorrected 18/24/12

- Sheard’s criterion: (criterion is not met)

- Patient is unable to clear plus side of flippers on both binocular accommodative facility and monocular accommodative facility
POLL QUESTION 4

• What is your diagnosis?

• 1) Convergence excess

• 2) Convergence excess with accommodative excess

• 3) Basic esophoria

• 4) Basic esophoria with accommodative excess
CASE 4 – ANALYSIS

Convergence excess with accommodative excess

- Vergence and accommodative anomalies often occur together – must analyze both vergence and accommodative tests

- Convergence Excess: esophoria near > distance, reduced negative fusional vergence

- Accommodative Excess: high Amps, unable to clear plus on flippers
9 y/o Asian female presents for comprehensive eye exam after being referred after school screening. She is having some difficulty seeing small print on the blackboard.

HPI: Pt. reports blurry vision whenever looking at distance and she has noticed the onset gradually in both eyes over 3 months. She notices the blurry vision throughout the day and she frequently squints when looking at distance. The patient reports occasionally closing one eye when looking far away above eye level. The patient’s mother reports her daughter appears to be sensitive to bright lights and frequently closes one eye at distance but is doing very well in school.
CASE 5 – ENTRANCE TESTING

DVAsc: 20/60- OD, 20/60+ OS
NVAsc: 20/25 OD and OS

- CTsc: 16 prism diopters exotropia at distance & 7 prism diopters exophoria at near (primary gaze)

- EOMS: SAFE OD and OS but V-pattern exo is noted

- NPCsc (light): 10cm/12cm

- Stereo: 30 sec arc at 40cm

- Pupils: ERL, no RAPD
V-PATTERN EXOTROPIA
CASE 5 – REFRACTION

Subjective refraction:

OD  -1.00-0.50x180 20/20 (NVAcc 20/20)
OS   -0.75-0.75x180 20/20 (NVAcc 20/20)
CASE 5 – ADDITIONAL TESTING

• Put the subjective findings into the trial frame and repeated the cover test and near point of convergence findings

• CTcc: 7 prism diopters exophoria at distance (primary gaze) & ortho at near

• Near point convergence (light): To tip of nose (TTN)
POLL QUESTION 5

• What is your diagnosis?

• 1) Divergence excess

• 2) Basic exo

• 3) Convergence insufficiency

• 4) Divergence insufficiency
CASE 5 - ANALYSIS

Divergence excess

Myopia

- Correct significant refractive error before proceeding – this fixed the near point signs but patient still had distance symptoms

- Prescribe and follow-up at future visit to monitor symptoms
- May not need to do additional testing if no symptoms (but make sure to ask the right questions!)
CASE 5: ANALYSIS AND FOLLOW-UP

• Prescribed subjective refraction and had pt return for follow-up after 1 month eye glass wear to monitor symptoms.

• Follow-up visit: No near point symptoms. No eye strain or diplopia when looking far away. The patient’s mother does note that the eyes look like they’re drifting only when looking far away and up, but not bothersome.

• Entrance testing consistent with evaluation with subjective refraction at last visit
18 year old patient, just started college presents with the cc of blurry vision when reading.

HPI: The patient reports the symptoms start immediately after reading for 5 mins. and that his symptoms have been getting worse since starting college. The patient reports trouble with both eyes and the blurry vision lasts during the duration of reading and that the symptoms are worse in the evening. The patient reports his symptoms are relieved after breaks and he has been avoiding reading. He is worried about his grades.
CASE 6 – ENTRANCE TESTING

DVAsc: 20/20 OD and OS
NVAsc: 20/20- OD and OS (slow)

• Cover test (uncorrected): ortho at Distance, ortho at Near

• Push-up Amp (uncorrected): 3D OD, 3D OS

• EOMS: Smooth, accuract, full and extensive

• NPCsc (light and red lens): To tip of nose (TTN)

• Stereo sc: 50 sec arc at 40cm

• Pupils: ERRL, no RAPD
CASE 6 – REFRACTION

Subjective refraction:
OD +0.25 20/20
OS +0.25 20/20
Case 6 – Additional Testing

Cover test (uncorrected): ortho at near
Cover test (through +1.00 OU): 6 prism diopter exophoria at near

AC/A ratio: 6/1

Step vergences (through +1.00) NBI: x/20/18, NBO: x/24/21

Is the compensating vergence through +1.00 adequate to compensate for the phoria through +1.00 (Sheard’s criterion)? Yes!
CASE 6 – DIAGNOSIS

Accommodative insufficiency

- To help with near work need plus to make up for lack of accommodation
- Trial frame Rx with extra plus at near to assess the impact of extra plus on the patient
LECTURE OBJECTIVES AND RECAP

• Identify the compensating vergence for all types of phorias and predict if a patient is likely to be symptomatic based on Sheard’s criterion

• Predict the effect of an Rx on ocular alignment using the AC/A ratio

• Calculate Amps when the amp is measured through something other than the best distance refraction

• Duane White and accommodative diagnoses
  • When provided with cases, classify into Duane White/accommodative diagnoses
  • Predict findings if given the Duane White or accommodative diagnosis