Clinical Pearls for Treating Vertical Deviations

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Course Description: Dr. Simonson will share Clinical Pearls in treating vertical diplopia. This course will discuss eye alignment testing, prism prescribing and recommended techniques to decrease symptoms and improve fusion skills for patients with vertical strabismus.

Course Objectives:

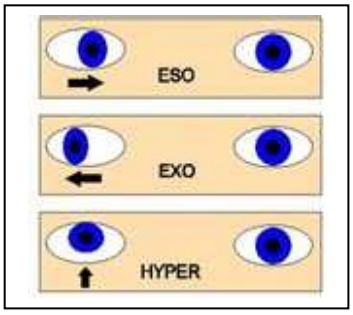
1. Assessment of vertical ocular deviations including techniques to evaluate children.
2. Learn how to determine the best prism prescription to enable fusion
3. Learn the best types of fusional targets to use in the therapy room.
4. Add head movement and target movement to vision therapy techniques.
5. Understand how to program a successful sequence of vision therapy activities for treating vertical deviations.
6. Clinical pearls for treating vertical deviations

I. Use Prism to enable fusion.

1. Measure the angle of the eye turn in primary gaze at distance and near distances.
2. Determine gaze and distance of best fusion stability
3. Determine the minimal prism to fuse images in primary gaze.
4. Measure the Fusional Range
5. Trial Framing

1) Cover testing and PRISM NEUTRALIZATION:

   When the prism moves the image of the target to where the eye was aiming, the patient no longer has to move their eye to point at the target.



- Where WAS the eye pointing? It will have to move to line back up again, so use prism to move the image to where they eye no longer has to adjust to point at the image.
  - eyes move out: eso, use BO prism
  - eyes move in: exo, use BI prism
  - eyes move down: hyper, use BD prism
  - eyes move up: hypo, use BU prism

2) Von Graefe Phoria testing
   - This is the result of the subjective reporting of the patient of when the targets LOOK lined up.
3) Maddox Rod
   - I recommend this test for getting an accurate subjective response from young children (as young as age 3).
4) Modified Thorington testing
   - Also useful for young children
5) Howell Phoria card

6) Keystone skills
7) Phoria and Fixation Disparity Testing
8) Rotoscope/Amblyoscope/Synoptophore
    - Physical movement of targets until they align.
9) Computerized alignment testing
    - VTS-3 Motor Fields

Trial frame: There IS fusion during this testing. The patient can also report clarity and comfort differences between the prism choices. Determine the minimal prism to fuse images WELL in primary gaze.

II. Use the minimal amount of vertical prism for MAXIMUM ability (don't under prescribe, but bias towards comfort).

Usually this is about 90% of the turn.
Center the amount of prism in the middle of the fusional range.

- Often, vertical prism can be put into the patient's glasses prism or applied to their glasses with Fresnel prism.
- Increase or decrease the amount as needed in the therapy room to make the patient functional.
- Angle the prism as needed if there is a diagonal misalignment. (Rotate the target if there is cyclotorsion)

- When is it tricky to use prism?
    1. Near and distance vertical deviations are not equal.
    2. Contact lens wearers.
    3. Induced hyperphoria due to spectacle correction (anisometropia).
    4. Torsional deviations (cyclophoria rotation).
    5. Patient who does not wear glasses.
    6. The need for very high amounts of prism.
    7. Non-comitant eye turns (amount varies depending on what direction the patient looks).
- Determine gaze and distance of best fusion stability
- Place targets in the position of best fusion.
- Place the person's gaze in the position of best fusion.

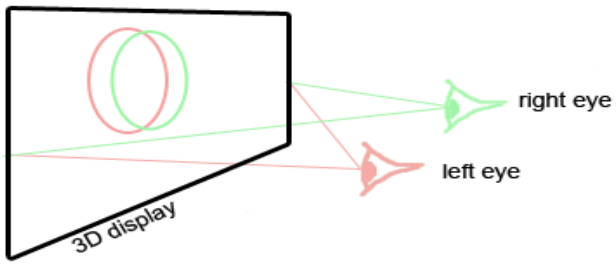
III. Use VERY STRONG stereo targets

A. Vectograms are great:

1. A clown vectogram is a better fusional target than quoits.
2. Work from stronger fusional targets to 2^{nd} and 1^{st} degree targets.
3. Use projected vectograms to build fusional skills.
4. VTS vertical fusion targets are better for initial training than HTS random dot targets.

B. When to Use Anaglyphs:

1. Typically you will use polarized targets before red/green targets except when a cyclorotation will prevent cancellation of the polarization.



IV. Don't increase the demand too quickly. Make sure that when the patient is fused, that the patient is FUSED WELL.

- Add head movement before increasing fusional demand.
- Work the edge or border of fusion. Do not alternate between single and double: adjust from blurry/uncomfortable - to "Different" and then STOP! and get it back into single and comfortable. Make it a goal to see tiny changes - if the patient loses any depth or SILO then STOP; emphasize small increments, or "just noticeable differences."

V. Clinical Pearls

1. Start with eye movements:
    a. Do wide monocular eye stretches to free adhesions and strengthen tissue from disuse at least 10 times per day.
    b. Trampoline and head movements (VOR)
    c. Optokinetic movements (OKN)
2. Use VERY STRONG stereo targets
    - Work from stronger fusional targets (3^{rd} degree stereo) to 2^{nd} and 1^{st} degree targets.
    - Use Computer generated targets
3. Use projection to build fusional skills at distance.
4. Make sure that when the patient is fused, that the patient is FUSED WELL.
    - Add head movement before increasing fusional demand.
    - Make it a goal to see tiny changes - if the patient loses any depth or SILO then STOP; emphasize small increments, or "just noticeable differences."
5. How to Modify Target Positions:
    - Offset Targets Diagonally
    - Use Prism to move target positions optically.
6. Build fusional ranges (both horizontal and vertical ranges) and THEN wean off prism as SLOWLY as possible.
    a. Don't be too quick to cut the prism. Typical expectations are to cut 1 prism diopter per month.

VI. Recommended Therapy Exercises

1. Equalize monocular skills
    - There can be contracture (tightening) of the muscle fibers, decreased flexibility, decreased mobility etc.
    - Start with MONOCULAR
        1. Eye Stretches
        2. Ball on Back, string & dowel, & Pursuit Tracking
        3. Face of Clock, 4 corner, Baseball etc. Saccades
        4. Rotations (projected, on a pegboard, in real space)
        5. Acuvision or Saccadic Fixator Saccades
        6. Space fixator (Look, Ready, Touch, Back)
2. If the Patient is able to fuse, use strong fusional targets in the therapy room:
    - Make it EASY for the patient to MAINTAIN binocularity
    - Use depth perception targets:
        1. Vertical Vectogram
        2. Horizontal Vectograms (can move diagonally)
        3. HTS or VTS-3 Vertical vergences
        4. Rotoscope/Amblyoscope
        5. Bernelloscope with Visicare vertical fusion cards
        6. Wheatstone "Flying W" Cheiroscope
3. Use Prism as a Support to MAINTAIN fusion:
    - Trial frame prism
    - Fresnel prism on their glasses
    - Prism Bar
    - Lollipop prism
    - Prism attached to stereoscopes
4. Use Target Position as a Support to MAINTAIN fusion.
5. Add head movement:
        1. Have the patient STOP with the target looks "less clear" "less 3-D" "different" etc.
        2. DO NOT go: single-double-single-double
            1. Head turns left and right
            2. Head tips up and down
            3. Head tilts to right shoulder and left shoulder
            4. Head Rotations
    - Allow the patient to put their head in the BEST POSITION to FUSE, and then work towards straight.
6. Use Free Space Fusion Techniques:
    - Offset targets as needed to enable fusion.
    - If there is a cyclorotation, you may also need to tilt the targets to fuse.
    - Use CIRCULAR TARGETS, and you won't have to rotate the targets to fuse the images.
        1. String and Dowel
        2. Brock String
        3. Chiastopic Thumbs

4. Eccentric Circles
5. Life saver cards (cut apart)

7. Increase the Difficulty:
    - Move the head position
        1. Move from level to a more difficult position (opposite tilt/turn)
        2. Move the body closer and further from the target
    - Change the target positions:
        1. Go from diagonal to level for all targets
        2. Move target beads on the Brock string/String and Dowel closer and further
        3. Increase BI and BO ranges first
        4. Work on vertical fusional ranges
    - Decrease the supportive prism
8. Use more challenging fusional targets:
    1. Tranaglyphs
    2. Bernelloscope Cards
    3. Sports Disk
    4. BC Fusion Cards (*70 series is vertical fusion)
    5. Keystone or Alphabet fusion Cards
    6. Aperture Ruler
    7. Magic Eye
9. Pull eyes into vertical alignment WITHOUT FUSION:
    1. Squinchel
    2. After-image flash tracking
    3. Voluntary Vergences
    4. Red light/red ring
    5. Simultaneous perception targets
10. Increase the ease and speed of alignment
    1. Start with small transitions:
        1. Prism flipper
        2. Prism Bar
        3. Double vectograms
        4. Jump ductions on the computer
    2. Near-far targets
        1. Start with small transitions (“walk away” techniques)
        2. Build up to a projected vectogram, projected computerized target, or window target to a hand-held target
    3. Look away or Close eyes – work on speed to regain fusion.
11. Demonstrate a range of fusion:
    - Maintain fusion in “activities of daily living” = real life (functionally less double vision/eye strain)
    - Maintain fusion with good posture (no compensations with head or body)
    - Maintain fusion with BO/BI (and BU/BD) (variable distance near and far)
    - Maintain fusion with Rotating Targets (variable gaze)
        1. Chiastopic Thumbs – rotate them in a circle; move them horizontally, vertically, and diagonally. Use fingernail polish as a suppression control.
        2. Sports Disc

3. Rotating peg boards
4. Projected targets rotating (mirror rotation/VTS-3)
5. Rotate free space fusional targets at arm's length: eccentric circles, Brock string, string and dowel, vectograms, and tranaglyphs for home therapy.

Specific Vertical Fusion Exercises:

1. Vertical Vectogram
2. Vertical Visicare Cards for the Bernelloscope
3. Variable prism Bernelloscope
4. Vertical VTS-3 and HTS
5. Prism (bar and lollipop)
6. BC Cards – 70 series

How long will therapy take?

- Successful therapy may require 60 – 80 hours of office therapy.

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4. http://www.nova.edu/hpd/otm/otm-b/phoria.html
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6. The College of Optometrists in Vision Development Fact sheets
7. Correspondence with Bob Sanet, OD, FCOVD
8. Clinical Experience with patients with decompensating vertical phorias, 4th nerve palsy, Brown's Syndrome, vertical misalignment following strabismus, cataract, and scleral buckle surgeries, and orbital blow-out fractures.