



Clinical Techniques for Prescribing Bioptic Telescope Devices

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Course Description

- Practical, clinical approach to evaluating visually impaired individuals for bioptic telescopes
 - Clinical protocol
 - assessment of an individual's visual needs
 - determining appropriate patients
 - establishing a prognosis for likely prescription success
 - Methods for fitting and training patients
 - Practice management tips



Challenges of Low Vision Care

- Major optical goal is to magnify the image sufficiently to make it discernable by the patient
- Magnification
 - minimizes the field of view,
 - distorts the image,
 - shortens the working distance,
 - and constrains the depth of field
- All of these work to undermine fluency and increase fatigue.

The activity distance determines the type of management

- Optical magnification requires that the material to be viewed be held at the focal length of the optical system
 - Usually much closer than the habitual working distance of the user
- However, some activities must be performed at distances defined by the activity
 - Cooking, reading music, TV, computers, traffic signals

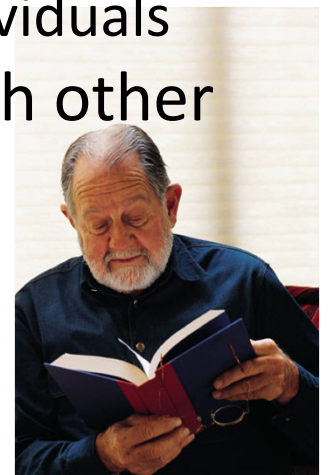


The activity distance determines the type of management

- The optical device must provide a working distance supportive of the activity
 - magnify the image enough to be able to resolve it
 - telescopic aids
 - focusable or
 - fixed-focus using reading caps
- Move closer
- Bring it closer optically
 - Telescopic aids

Reading is a solitary activity

- Usually the first activity that the patient hopes to improve
- Reading is usually done at home or in isolated situations
- Easiest to support
 - print is high contrast
 - lighting can be controlled
 - devices prescribed are often familiar to most individuals
- Reading is also the most easily replaced through other option
 - radio, books on tape,
 - sighted readers, reading machines



Distance vision is a social activity

- A public activity
 - impacts social interaction
 - hence quality of life.
- Loss of ability to see body language and make eye contact
 - isolating
 - contributes to depression
- Impacts independence and self-worth
- Cannot readily be replaced through other modalities

Refraction

First option to improve distance vision

- First and most convenient option
 - usually a two-line improvement is required for the patient to experience a functional gain
- Brief retinoscopy through the current eyeglasses
 - see how close to neutral the reflex is as well as its quality
 - If the reflex is dull due to media issues, consider therapeutic options that might improve it.
 - No amount of lens power will impact acuity if there are significant media opacities
 - If the patient is post cataract surgery with IOLs, it is unlikely that they will have a significant refractive error
- Trial Frame



Refraction

- Make a sufficient enough power change for the patient to notice (JND)
 - If they can't notice a half-diopter change, then try one or even two-diopter changes
- High-contrast acuity chart is a poor determiner of functional value
 - Low contrast target such as someone's face at the furthest distance that they can normally see it
 - If the patient can notice a difference, then it's likely to be of functional value
- Acuity will fluctuate as fixation varies
 - You won't get big changes in acuity from small changes in power

Ways to further enhance distance vision

- When refraction is the best you can achieve and acuity remains inadequate for the patient's goals, than there's only one option left to further enhance distance vision- make it bigger!
- We have only two ways to do that—
 - walk up close enough to see it
 - bring it closer optically

Low Vision Telescope Optics “101”

- Optical telescopes are available in two designs—
 - Galilean
 - Keplerian
 - Each has its distinct characteristics and attributes.



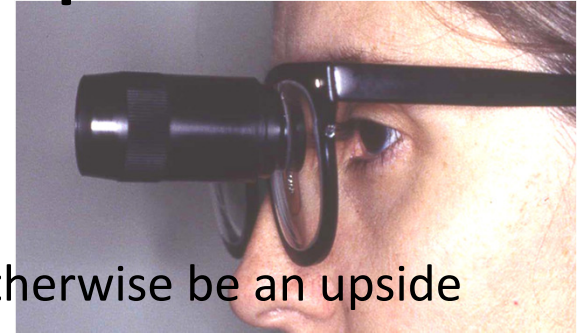
Galilean telescopes

- Small and lightweight
- Simple optical design
- Bright image
- Narrow fields of view
 - (about 5 degrees at 3x)
- Tend not to be sharp edge-to-edge
- Fixed-focus
- Focusable
- 1.7x, 2.2x and 3x powers, but are available as high as 6x .
- Convenient for binocular prescriptions



Keplerian telescopes

- Longer
- Heavier
 - Incorporate prisms to reorient what would otherwise be an upside down and inverted image.
- Fields of view at least twice as large as Galilean telescopes
 - (about 12 degrees at 4x)
- Dimmer and have reduced contrast
- Larger objective lenses produce brighter images
- All commercially available Keplerian telescopes are focusable
 - One autofocus device
- Most frequently prescribed in 3x, 4x and 6x powers, though other powers are also available.



The prescriptive goal

- **What are we trying to achieve when we prescribe a telescopic device?**
- 20/40?
- >5 degree Field of View?



The patient's perspective on telescopes

- Everything appears closer
- The value to the patient is that they can see it further away
- A 4x TS will allow a target normally only visible as far as 10 feet away to now be seen *as far as* 40 feet away
- Not all patients receive a geometric acuity gain from telescopes

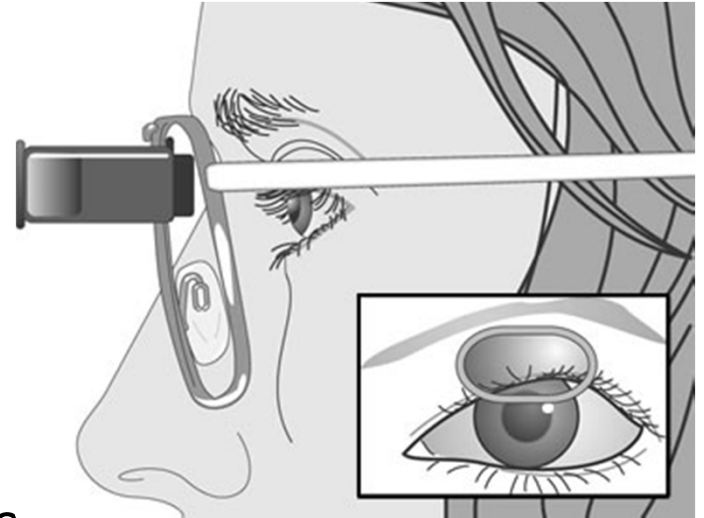


Telescopic Options for Low Vision

- Handheld
 - Galilean and Keplerian: 2x to 8x+
 - Magnification greater than 6 or 7x, then handheld monoculars (or even binoculars) become the only compelling option
 - If the telescope would be used only rarely and for episodic activities often a handheld version would be acceptable
- Spectacle clip-on
- Head born self-contained

Head Born Telescopic Options

- Hands are unavailable
- Lack of dexterity
- Extended viewing purposes
- Spectacle mounted designs
 - Full diameter
 - telescope centered in the frame
 - Bioptic
 - positioned above the line of sight so that the user can alternate their view between the carrier lens and the telescope



Telescope Prescribing Protocol

- The **Telescope Prescribing Protocol** is divided into two parts
- ***Hard Signs***, those that can be measured or otherwise determined
- ***Soft Signs***, those that are judgments and are developed through patient interaction

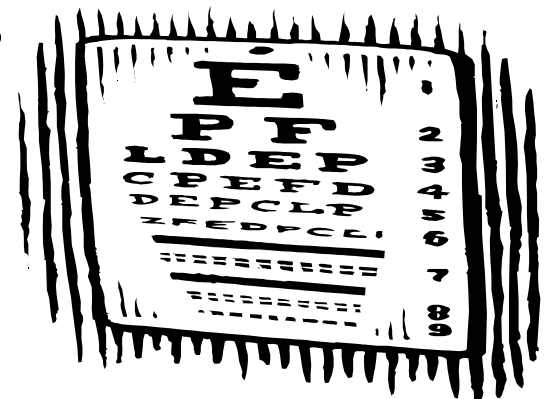
Hard Signs

- **Visual Acuity:**

- **Best corrected visual acuity through conventional lenses is in the 20/70 to 20/300 range**

Goal:

- The patient should be able to read fluently to at least the 20/50 line while looking through the telescope.
 - 20/40 for more demanding activities
 - 20/30 for very demanding activities



Hard Signs



- **Contrast sensitivity:**

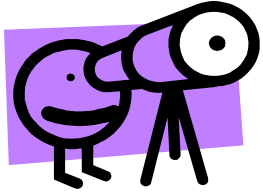
- Able to see facial features while looking through the telescope at a distance of 12 feet under normal room illumination

Goal:

- They should see the face much better through the telescope

Negative responses:

- If they report that the face is larger but NOT easier to see than the prognosis for telescope success is reduced.
- Consider Galilean devices rather than Keplerian, or handheld Keplerian monoculars with large objective lenses.



Hard Signs

- **Ocular Dominance:**

- The better seeing eye is the dominant eye, OR, that while looking through the telescope the dominant eye sees better than the fellow eye

Goal:

- The better seeing eye is the dominant eye.

Negative response:

- If the better seeing eye is not dominant (there is a “dominancy conflict”), it is often desirable to prescribe a binocular system. Another approach, though less successful, is to occlude the dominant eye while the patient is sighting through the bioptic.

Soft Signs

- **Appropriate activity goals for use of the device**
 - Midrange and beyond activities
 - Have patient tell you what they'd use it for
- **Goal:** The patient has mid-range and beyond visual activity goals.

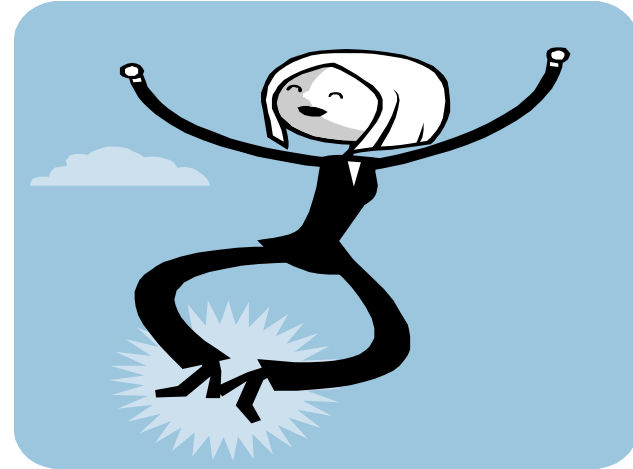


Soft Signs



- **Dexterity with the device**
- **Goal:** The patient responds to the device favorably, can find targets while looking through the device, and improves with practice during the evaluation.

Soft Signs



- **Motivation and enthusiasm**
- **Goal:** The patient is excited about how they are seeing with the telescope and embrace the opportunity to improve their vision.

Summary

- In the final determination of an appropriate bioptic prescription, a combination of the hard and soft signs will create an overall prescribing prognosis for the individual patient.
- This systematic approach can be helpful in advising the patient of the likelihood of their successful adaptation to the telescope system.

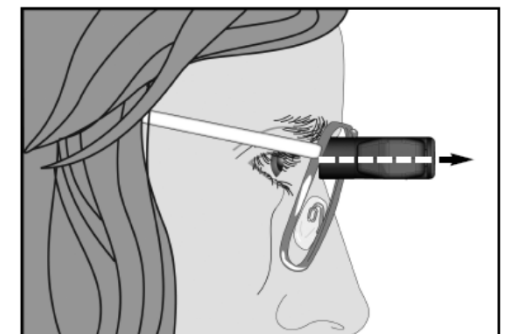
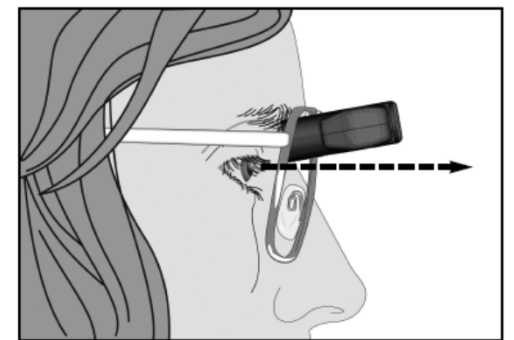
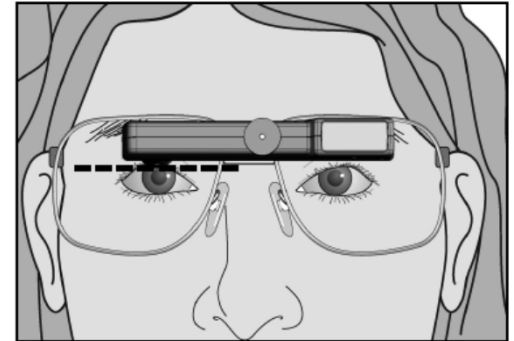
Rating Suggestion

- Assign a value of 2 points to each of the 6 clinical signs, and assign a rating scale in $\frac{1}{2}$ point increments.
- A score of 9 or above offers a favorable prognosis.
- Six or below suggests a poor prognosis

	Poor			Good	
	0.5	1	1.5	2	
Factor					Goal
VA 20/70 to 20/300 with conventional Rx					20/50 or better with TS
Contrast Sensitivity (facial features at 12ft)					See face much better with TS
Ocular Dominance					Better seeing eye is dominant
Appropriate activity goals					Mid-range and beyond goals
Dexterity with device					Improves with practice during evaluation
Motivation & Enthusiasm					Excited about how they see with bioptic

Bioptic telescope fitting steps

- Determine the eye that will use the TS
- Align with that eye
- Adjust the bridge so that the bottom of the eyepiece aligns with the top of the pupil
- Adjust the telescope angle of inclination to site straight through the eyepiece when the head is tilted down
- Set the focus



Patient management protocol

- Instruct the individual regarding the impact and value of the device
- Explain the factors that contribute to establishing their likelihood of success



Patient management protocol

- Indoctrinate the patient
 - Explain the impact of low vision on lifestyle
 - Explain characteristics of low vision telescopes
 - Narrow field of view
 - Shallow depth of field
 - Need to focus
 - Need to keep head still
- Evaluate the patient and demonstrate telescopes
 - Show handheld devices first- demonstrate DOF, FOV, and focusing
 - Show spectacle-mounted systems next
 - Provide realistic experiences
 - out of the exam room- show packages on shelves, faces, pictures, TV, flowers, signs, etc.

Patient management protocol

- Qualify the patient
 - Explain hard signs- VA, contrast, dominance
 - Explain soft signs- goals, dexterity, and response
- Recruit the patient
 - Establish a prognosis- based upon hard and soft signs
 - Discuss the challenges and need for training and practice

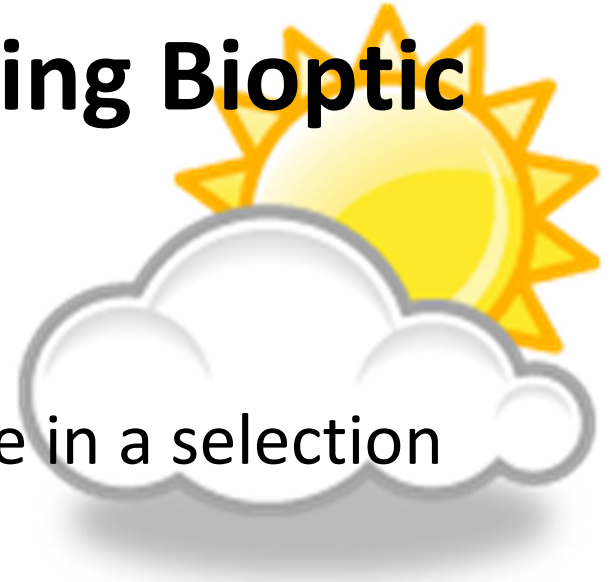
Clinical Issues for Prescribing Bioptic Telescopes

- Carrier lenses
 - Order the eyeglass prescription the patient normally wears for distance vision.
 - Prescribe a bifocal if that is what the patient usually wears.
 - We normally use flat-top and round segment designs
 - avoid trifocals and progressives.

Clinical Issues for Prescribing Bioptic Telescopes

- Maintain at least 10mm between the top of the bifocal and the bottom of the eyepiece.
- Eyepiece Corrections:
 - Varies upon the brand of telescope
 - Designs for Vision:
 - all prescriptions
 - Ocutech:
 - sphere power above +/- 12D, or cylinder above 3D

Clinical Issues for Prescribing Bioptic Telescopes



- Illumination Control
 - Slip-behind sun filters are available in a selection of colors
 - Filter caps and internal filters can also be ordered
 - Fitovers (NOIR, etc.)



When should I consider prescribing autofocus?



- Visual activities from 15 feet and closer
- When visual attention will be frequently alternated from near to distance
 - such as from the desk to the blackboard
- When extended near-point activities are required
 - such as playing cards, musical instruments, or using the computer.

Why not consider electronic vision displays?

- Technical challenges have not yet caught up with the dream
- Issues
 - Field of view
 - Stabilization of images
 - Contrast and contour
 - Display brightness
 - Mobility



Telescope Training Techniques

- **Give the patient a tour of the device**
Carrier lenses, Telescope eyepiece, Focus knob
- **Focusing**
 - At distance- take advantage of depth of field
 - Place the focus
 - At near- preset, hand focus, and head focus

Telescope Training Techniques

- **Translation** (switching fixation between the carrier lens and telescope eyepiece)
 - Look first through the regular eyeglass lens (carrier lens) of the bioptic which provides your customary distance vision.
 - Look directly at the object you want to magnify.
 - Drop your head slightly and look up into the eyepiece.
 - You should see a full, round magnified image.
 - You may have to focus it to get the image clear.
 - Practice switching between the carrier lens and the telescope until you can do it easily and without losing your target.

Telescope Training Techniques

Localization at near

- Near objects can be more challenging to find due both to the narrow field of view and the visual mismatch
- First find the object in the telescope field of view,
 - while looking at it, pass your upraised finger across the field of view several inches in front of the target
 - Once you can see both your finger and the target at the same time, watch your finger as it moves in to touch the target
- You **MUST** watch your finger while looking through the telescope to learn to do this
- A convenient technique:
 - Try to touch the buttons on a telephone keypad
 - Disconnect the phone first!

Telescope Training Techniques

- Have the patient put it on, take it off, and put the bioptic away themselves
 - Place level on the face
 - Temples flat across the ears
- Discuss proper care and cleaning
- The eyepiece is apt to get soiled and filmy
 - Clean with an approved microfiber cloth
- The device should never be placed under a faucet!

Trouble shooting bioptic systems

The patient does not see a full field

- Check to see that the telescope is properly aligned and inclined for the patient
- Review the eyepiece position fitting method
- Adjust the bridge and temples to reposition the aid for the proper line of sight

Trouble shooting bioptic systems

The image is not clear

- Check to see that the telescope is properly focused
- The eyepiece and front lenses are clean
- There is not significant refractive error that might preclude clear vision through the telescope.
- Check that the patient is using the appropriate eye to sight through the telescope
- Make sure there isn't a dominance conflict that undermines the functionality of the device

Trouble shooting bioptic systems

The patient complains that the field of view is small

- Check to see if shortening the vertex distance is possible by adjusting the bridge
- Also explain that all telescopes have a narrow field of view, but that patients usually will adapt over time

The patient complains that they have to drop their head too much to see through the telescope

- Check to see that the frame is as low as possible on the bridge
- Check that the angle of inclination of the telescope is as low as possible

Trouble shooting bioptic systems

The patient sees two images:

- **Monocularly:** If the diplopia occurs when only the eye using the telescope is open, readjust the telescope position to eliminate the second image
- **Binocularly:** If the diplopia occurs only when both eyes are open, consider:
 - The patient is unable to suppress the eye not using the telescope.
 - The non-dominant eye was prescribed the telescope
 - One option is a sector occluder across the top of the carrier lens for the non-telescope eye
 - Another option is to prescribe a binocular system

Trouble shooting bioptic systems

The image through the telescope is too dim.

- Recheck the eyepiece position
 - Slight misalignment can significantly decrease image brightness
 - Shine a penlight into the front of the TS to determine the eyepiece position on the pupil
- If this is still not adequate, check that the front and back lenses are clean and free of grease and oil
- Check also that the internal optics are not fogged by holding the telescope to a light and looking through it backwards (through the objective lens)

Dr. Greene's Pearls



- If the patient has reasonably good acuity (20/80 or better), I'm considering 2.2x and 3x Galilean, or 2.75x and 3.0x Keplerian devices (if field of view is a concern)
- If acuity is similar between the eyes or if I'm concerned about dominance issues, I'll consider the same powers in a binocular design
- If contrast is an issue, I'm thinking about Galilean designs first
- If acuity is between 20/100 and 20/300 I'm thinking 4x and 6x Keplerian designs, especially if there will be near point applications and I want them to be able to focus
- If acuity is worse than 20/400, I'm thinking 8x and higher handheld monoculars or hi-power (7x) head born devices