

## Case 4

### History of Present Illness

A 29-year-old man complains of left eye pain with prolonged near work for the past several months. The pain begins after reading for several minutes and spreads to his frontal region and the right eye unless he stops reading. If he does not read, he does not really develop pain. He describes it as an ache that worsens to a 5/10 at its worst. The clarity of his vision in each eye is unaffected. He denies double vision, ptosis, oscillopsia, eye redness, and epiphora. He does not wear glasses, but has recently purchased over-the-counter readers, which did not help.

<i>Past medical and ocular history</i> Chronic sinusitis	<i>Past surgical history</i> Sinus surgery
<i>Social history</i> 1–2 beers daily, occasionally smokes marijuana but not cigarettes, salesman	<i>Family history</i> No history of migraine, no eye disease Mother has glaucoma
<i>Medications</i> None	<i>Review of systems</i> Negative

### Examination

<i>Acuity without correction</i> Right eye: 20/20 distance and near Left eye: 20/20 distance and near
<i>Cycloplegic refraction</i> Right eye: +0.25 Left eye: Plano
<i>Pupils</i> Equal in size, briskly reactive, round

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*Intraocular pressure*

Right eye: 20 mmHg

Left eye: 19 mmHg

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*External exam*No ptosis, no proptosis, normal appearance

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*Eye motility and alignment*

Normal eye excursions, both eyes

Normal pursuits and saccades

Orthophoric in the distance in all gazes

12 prism diopter intermittent exotropia at near

Near point of convergence 20 cm (Fig. 4.1)

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*Slit lamp examination*

No blepharitis

No keratopathy or tear film dysfunction

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*Visual field*Normal

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*Fundus examination*Normal

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*Neurologic examination*Normal

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**Fig. 4.1** The patient is focusing on the examiner's finger as it is brought closer to the nose. At this point, 20 cm away, the patient's right eye is focused on the finger, but the left eye has just deviated off the finger. This patient has an abnormal near point of convergence consistent with CI



## Discussion

### *Ophthalmic Perspective: Dr. Lee*

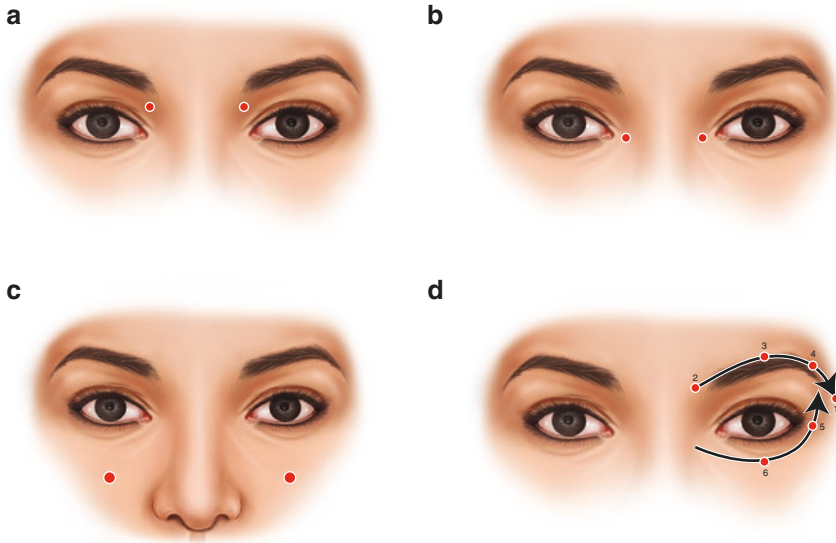
This patient gives a story most consistent with “eyestrain,” where folks complain of bilateral eye tiredness or aching that can radiate to the temples or the frontal region with prolonged reading. Nowadays, you might hear it called “Computer Vision Syndrome” as well. Sometimes this story could be consistent with dry eye syndrome (see [Case 1](#)), and this should be ruled out. Eyestrain is a wastebasket term that includes uncorrected hyperopia, over-corrected myopia, poor accommodation, or eye misalignment at near. Eye evaluation should include a good refraction at

distance and near pushing plus. Patients younger than 45 may require a cycloplegic refraction to determine any hidden hyperopia or overminus. Cover testing with a near target may show an exo- or hyperdeviation. A Maddox Rod can help identify cases of tiny hyperdeviations that may be difficult to observe.

The patient herein has a convergence insufficiency pattern—full eye movements, exodeviation greater at near, and a distant near point of convergence. Typically, the exodeviation measures at least 10 PD more at near than distance. Normally, the eyes can converge on a target at <8 cm. Convergence insufficiency (CI) in this age group most commonly results from head trauma or is idiopathic. He denies trauma, and there is no need to pursue neuroimaging for *isolated* CI. Management usually involves pencil pushups, where one looks at a target and brings it closer to the eyes until it becomes double or blurred. The goal is to strengthen convergence by doing these exercises hundreds of times a day. In our experience, most patients do not have the discipline to do these. Other options include giving base in prisms for reading, formal therapy with a trained orthoptist, computer-based convergence programs, patching an eye for reading (not ideal) and surgery (rarely performed). Monovision could be considered for presbyopic patients unable to tolerate the options above.

### ***Neurologic Perspective: Dr. Digre***

When I see someone with this history I do three things. First, I go over the migraine history, because MANY patients with this disorder often are visually sensitive and have migraine (see [Case 19](#)). Sometimes you have to ask, “you mean you have never had a headache?” and then “did this headache ever make it hard for you to do your work?” “were you ever light or sound sensitive with your headache?” I also ask whether the reading problem is all types of reading material (like computer screens, tablets, television, or books) in all forms of lighting—fluorescent lighting and computer vs incandescent bulbs. Then on examination, I first look at acuity—and see if this patient could be a latent hyperope (meaning they are far-sighted). I look really carefully for dry eyes and sometimes perform a Schirmer’s test. We are a computer using generation, and when we are on the computer, we blink less frequently, which can set up dry eyes in someone you would not suspect. I agree that looking for convergence insufficiency or divergence insufficiency is also important. Sometimes we look at convergence and divergence amplitudes—how much reserve does a person have. For example, we can use a prism bar and push it up and down base in or base out to test these amplitudes. Third I treat. If they have modest dry eyes, I stress lubrication at the computer screen. If they are also light-sensitive, FL-41 glasses can be helpful (see [Case 21](#)). I do stress pencil push-ups and sometimes even pressure points that were once developed by the Chinese for embroiderers for a living (see [Fig. 4.2](#)). The exercises have been tested in children to prevent myopia and accommodation with minimal benefits, but for eye strain in some individuals they may be more helpful.



**Fig. 4.2** Steps to Chinese exercises for eye strain. (1) Perform exercises in the morning and afternoon. (2) Do not push on your eye balls (3) Press the pressure point until an ache feeling occurs and repeat about eight times each time. (a) Push just under your eye brows (Zhan Zhu Point). (b) Massage the bridge of your nose (Fu Jing Ming Point) (c) Press on your center of your cheek (Si Bai Point). (d) Rub around your eye—first along your eye brow then a lower half circle below your eye

### *Non-ophthalmic/Non-neurologic Perspective*

When a patient complains of pain or headache with prolonged reading, consider that they may have eyestrain. In your office, you could consider having the patient stare at a near target such as your nose at 1/3 of meter. Alternately, covering the eyes may show a shift of the eyes as you go back and forth. If the eye shifts toward the nose, then that is consistent with an exodeviation as seen in CI. If the eye shifts up or down, then that is consistent with a hyperdeviation such as a fourth nerve palsy. You can also have the patient look at a target and bring the target to the nose. As you watch the eyes, they should converge on the target as it gets closer. If you see one of the eyes deviate outward as you bring it closer, then that distance is the near point of convergence. You could consider offering the patient convergence exercises, if the eye movements are otherwise full. In the absence of an eye misalignment, the patient will need to get a good refraction at distance and near with an ophthalmologist or optometrist.

## ***Follow Up***

The patient received a diagnosis of CI and was given pencil pushups. He reported noncompliance with the exercises. He was given the options of visiting with an orthoptist, using a computer convergence program, and base-in prisms. He was told that prisms might make him dependent on the glasses and that he may see double at near without the prisms. After consideration of all the factors, he elected to receive a prescription for reading glasses with six base-in prism in each lens. He reported significant improvement in his symptoms. *Final Diagnosis: Convergence insufficiency causing “eyestrain”.*

## **For Further Study**

1. Akinci A, Güven A, Degerliyurt A, Kibar E, Mutlu M, Citirik M. The correlation. between headache and refractive errors. *J AAPOS*. 2008;12(3):290–3.
2. Convergence Insufficiency Treatment Trial Study Group. Randomized clinical trial of treatments for symptomatic convergence insufficiency in children. *Arch Ophthalmol*. 2008;126:1336–49.
3. Lin Z, Vasudevan B, Fang SJ, Jhanji V, Mao GY, Han W, Gao TY, Ciuffreda KJ, Liang YB. Eye exercises of acupoints: their impact on myopia and visual symptoms in Chinese rural children. *BMC Complement Altern Med*. 2016;16:349.
4. Serna A, Rogers DL, McGregor ML, Golden RP, Bremer DL, Rogers GL. Treatment of symptomatic convergence insufficiency with a home-based computer orthoptic exercise program. *J AAPOS*. 2011;15:140–3.
5. Schieman M, Gwizada J, Li T. Non-surgical interventions for convergence insufficiency. *Cochrane Database Syst Rev*. 2011;3:CD006768.
6. Vincent AJP, Spierings ELH, Messinger HB. A controlled study of visual symptoms and eye strain factors in chronic headache. *Headache*. 1989;29:523–7.