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DIPLOPIA.....DON'T PANIC (JUST PUT ON YOUR THINKING CAP)

Lisa Rovick, CO, COMT

In the middle of another busy day, one thing guaranteed to send chills down the spine of any self-respecting tech is the phrase "I have double vision."

Here's the scenario: Your clinic was only running ½ hour behind, but the patients were beginning to rattle their chains. You call back the next patient on the schedule and begin the routine: "What brings you into the clinic today, Mrs. Skinner?" (You had looked in her chart and noticed that she wasn't due to have another clinic visit for six months.) Her answer is: "I have double vision in my right eye. It's really annoying me." Now, you see the end of the day (which had at least looked like a glimmer of hope at the end of a very long tunnel) disappear. Your first instinct may be to run the other way, turf the patient to another tech or "just let the doctor handle it".

I am here to offer an antidote to the fear of double vision. Instead of running the other way in panic, take a minute (or less) to organize your thoughts. Here is one possible framework you could use to add a bit of sanity back into the scene.

First of all, remember that your job is to gather enough information to let the physician make a plan for the patient. You are NOT expected to suddenly turn your hat around and become an orthoptist or ophthalmologist. Certain key bits of information are needed for the physician to answer these hot questions:

1. Is this an emergency?
2. Is this new or chronic?
3. Should I manage this patient myself or refer out to a specialist?

The answer to the last question will depend a great deal on your own practice, but YOU don't have to worry about that part. Your job is to provide enough information to answer those questions without sinking the rest of the day. In the context of a very full schedule, you need to be efficient with your use of time. You don't have the luxury of an extra magical hour to do a full work up. Just get the pertinent facts, "Just the facts Ma'am", and no more (at least for now).

The tricky part of this scenario is that the pertinent facts differ from patient to patient. You can't just do "vision pressure dilate" and be done. Your understanding of the possible causes of diplopia will help you decide what information to collect. It is also important to remember that double vision is scary and

uncomfortable. Your patient, Mrs. Skinner, may have already concluded that she is dying of a brain tumor, or has decided that whatever was done at the last visit to your clinic created the problem. Her mood may be fear or anger or frustration or all of the above. It is also possible that Mrs. Skinner saw someone else first, had the double vision after that encounter, and didn't return because she didn't trust them to be straight with her.

By asking a few simple questions, you will be able to get at the heart of the matter quite quickly. The answers to these questions will lead you to the right tests to do. The results of the tests will help to determine the treatment.

Questions to Ask Yourself and the Patient

1. Does the double vision disappear when you cover one eye? Does the double vision disappear when you cover the other eye?
2. How long have you had the double vision?
(The answer to this question will help you manage this patient, from a triage standpoint.)
3. Can you make the double vision go away by turning or tilting your head?
(The answer to this question gives you clues to finding the cause of the double vision and to ways of alleviating the symptom.)
4. Are the images next to each other, one on top of the other or diagonally placed?
5. Is one of the images tilted/slanted?
(This is more important if the diplopia is vertical)
6. Have you had any pain or other symptoms associated with the double vision?
(Other symptoms: new ptosis, anisocoria, balance problems or dizziness, numbness/tingling...)

Now that I have asked the questions, what do the answers mean?

1. Does the double vision disappear when you cover one eye? (and the companion question) Does the double vision disappear when you cover the other eye?

By asking these questions, you are able to determine if the patient has monocular or binocular diplopia. If the answer is "yes" to both questions, you probably have true *binocular diplopia*. If there is binocular diplopia, the patient most likely has either an eye muscle problem or may have induced

prism in their glasses. In a high spectacle correction, it is quite easy to induce vertical prism, simply with poor adjustment.

If the diplopia remains in one eye when the other is covered, you have *monocular diplopia*. In this case, it is unlikely that a muscle imbalance is the problem. More likely, culprits to consider are refractive problems, retinal problems, or problems caused by ocular media imperfections, such as a cataract or corneal opacity. If the patient is in the office, you can start the search for the cause of the diplopia by checking visual acuity with a pinhole. Refractive monocular diplopia will disappear, or at least diminish, with a pinhole. Cataracts and other media opacities may actually cause the pinhole vision to be worse than normal acuity.

Just to make your life more interesting, it is possible to have a combination of both monocular AND binocular diplopia! Make sure to ask all of the questions and investigate the entire scenario. If you stop investigating too soon, you may miss an important part of the patient's situation.

2. How long have you had the double vision?

The answer to this question will help you decide when the patient needs to be evaluated by the ophthalmologist. It is important to assess whether the diplopia is acute, chronic, or has had a gradual and progressive course.

A patient experiencing sudden onset diplopia, especially associated with pain, should get your attention right away. Cranial nerve palsies are the most likely suspect here, but the cause of the nerve palsy may not be clear. In any case, it is good to see these people right away to get a baseline measurement. If the onset is sudden, but has a clear cause, such as a blow out fracture or other eye surgery, you still should see the patient soon.

If the problem is chronic, the patient should be evaluated at some time in the near future, but it is not an emergency. If you are able to get an impression of the progression of the symptoms, it may be helpful to the doctor in determining a diagnosis.

Remember: Diplopia is very uncomfortable and makes moving around in the environment difficult. Many times, these patients are frightened. They have already imagined the worst.

Even if the actual eye condition does not constitute an emergency, the patient's level of anxiety may lead you to have them come in for evaluation sooner than you otherwise would have chosen.

(Patients with acute diplopia whose fears and needs are addressed quickly are some of the most thankful and happy patients I have seen.)

3. Can you make the double vision go away by turning or tilting your head?

The answer to this question gives you clues to finding the cause of the double vision and to ways of alleviating the symptoms.)

If the diplopia disappears or becomes much less troublesome with the use of a certain head position, it is likely that the patient has incomitant strabismus. This is due to either restrictive forces, such as entrapment or muscle inflammation, or a weakness in one or more muscles. It is also possible that an extreme head turn may cause the diplopia to disappear because the second image is occluded by the patient's nose.

4. Are the images next to each other, one on top of the other, or diagonally placed?

This determines the direction of the double vision. If the diplopia is horizontal, you are looking for weakness in adduction or abduction, or a near/distance disparity or an A-V pattern. If the diplopia is vertical, you are looking for weakness or restriction in either the vertical rectus muscles or the obliques. If the diplopia is diagonal, one or more of the oblique muscles may be involved.

5. Is one of the images tilted/slanted?

This question should be asked especially if the diplopia is vertical. If there is torsion, the diplopia is likely to be caused by one of the oblique muscles or by an irregularity in the retina.

6. Have you had any pain or other symptoms associated with the double vision?

By asking this question, you will obtain clues about the possible cause of the diplopia. You are looking for possible systemic causes of muscle imbalance. Many times, the patient is unaware that they have some of these systemic diseases. The ocular symptoms are the first presentation of the disease and the ophthalmologist may make the diagnosis.

NOW I HAVE ASKED THE QUESTIONS AND DECIDED WHEN THE PATIENT NEEDS TO BE EVALUATED. WHAT DO I DO WHEN THEY COME IN TO THE OFFICE?

FIRST OF ALL, TAKING A GOOD HISTORY IS IMPORTANT.

Ask all of the above questions again and chart the answers carefully. When you get to the general health portion of the history taking, make sure to include the following items:

- If there is pain, note where it is located
- The nature of the pain and the duration

- The presence of weakness or tingling sensations. Ask if the patient has noticed difficulty swallowing or slurred speech recently.
- Loss of vision or other visual symptoms in addition to the diplopia
- The presence of systemic disease, such as diabetes, thyroid disease (hypothyroid or hyperthyroid), Grave's disease, myasthenia gravis, multiple sclerosis, Parkinson's, hypertension
- The presence of ptosis or changes in the nature of the ptosis
- Anisocoria
- Any past eye surgeries or injuries
- Any past head injuries. If there was loss of consciousness, note how long.

Next, check for yourself that the diplopia is monocular or binocular. Cover each of the patient's eyes and ask how many images they see. Sometimes, a blurred image can look double. Also, one blurred image and one clear image can sometimes leave a ghost image. This is unlikely to be caused by strabismus; it is more likely refractive. If one image is blurred or double, check with a pinhole to see if the image quality improves. Also, ask if one of the images looks larger than the other. Again, this type of diplopia is not strabismic, but optical. Many times, patients with a history of a retinal problem, especially a macular problem such as a pucker or a macular hole, will complain of distorted images and aniseikonia.

Sometimes, aniseikonia can be reduced by changes in lens thickness and base curve. A good lab optician is invaluable in working out solutions to these sorts of dilemmas.

Once you have determined that the diplopia is indeed binocular, it is time to measure the deviation. In all cases, measure the deviation in primary gaze both at distance and near fixation, making sure that the patient can see your target with each eye. To measure straight ahead is the best, on both side gazes and in up and down gaze for distance and straight ahead and down (reading position) at near. If you don't have time to do all of those measurements, make sure in incomitant strabismus, to measure in the gaze positions where the diplopia is the worst and also where the images are the closest together.

With horizontal diplopia, you may find that the patient is much worse with fixation to one side, in up or down gaze (in A/V patterns), or that the diplopia is worse when looking either at near objects or distant objects. If the patient has an exophoria at near, it may be useful to measure fusional convergence amplitudes. This will help you rule out convergence insufficiency as the source of the symptoms.

With vertical diplopia, it is important to do a few more measurements to isolate the affected muscle. You need to make distance measurements to each side, as well as with the head tilted to each shoulder. This will assist the ophthalmologist in determining the weak muscle. In vertical diplopia, an assessment of torsion (tilting) is also useful. You do this with the double Maddox rods. Most phoropters are equipped with red and white Maddox rods. Turn one side to the red lens and the other side to the white lens. Have the patient look at a light (it will appear to be a line to the patient). Make sure the two lines are separated enough for the patient to tell them apart. Ask if the two lines are parallel. If not, ask which way the tilted line is going; this tells you if there is intorsion or extorsion. To measure the patient in the gaze position where the images are the furthest apart, as well as where they are the closest, is also important. This may

be an up gaze or down gaze. If this is true, the data you collect will be helpful in determining not only the etiology of the diplopia, but also in developing a plan to alleviate the symptoms.

If the patient has a history of variable strabismus, especially if it is accompanied by variable ptosis, the ophthalmologist may want to try administering the ice test: two gloves filled with crushed ice are placed over the eyes for two minutes. Once the ice is removed, there may be a dramatic change in the eyelid position or the eye position. If this happens, it is an indication that Myasthenia Gravis is at the root of the problem.

In all cases, look at the versions. There will probably be limitation of movement in one or more directions. There may be over action of the oblique muscles, as well. Be attuned to the presence of A-V pattern (horizontal deviations that change in size from up-gaze to down-gaze) when you are looking at the eye movements. If there is a limitation in the versions, make sure to also assess the ductions. The deficit in the versions may be only a relative weakness. If this is the case, the ductions test will be normal. A restricted or paretic muscle will still show a deficit in movement on ductions testing. While you are in the process of assessing versions, also assess the near point of convergence. It will be another clue to you.

Now that I have measured in all of the gaze positions, the patient is still uncomfortable. What options are available to make the patient more comfortable? (The goal in all of these cases is patient comfort. None of these options "cures" the problem or makes it resolve any more quickly.)

1. Fresnel Prisms

Fresnel Prisms are prisms made out of a plastic that adheres to the inside of spectacle lenses. The prisms can be cut to the shape of the lens and easily applied and removed in the office. Different powers may be used in cases of incomitant strabismus or near/distance disparity. Unfortunately, the plastic that must be used in order for the prism to adhere to the lens is not perfect optical quality. Patients may notice a blur on the side of the prism. It is helpful to let them know about this in advance so they are not alarmed. Most patients adapt to the blur relatively quickly, if the prism is placed over their non-dominant eye. The beauty of these lenses is that patients may be able to walk out of the office with their diplopia resolved! Even though they may not be "cured", their symptoms have been resolved. In cases of ischemic cranial nerve palsies, the strabismus may resolve with time. It is nice to be able to change the prism power as the patient improves, without needing to remake a lens.

2. Occlusion

Clip-on occluders or adhesive patches may be used. Pirate patches work well for this use, but they are REALLY noticeable. Some people prefer something a bit less obvious. Some patients are very bothered by light and images coming in from the side. In this case, total occlusion is better than something that is simply stuck to the front of the glasses. Another patching option is to use the cloth "patchworks" patches that are used for children who are using occlusion for amblyopia

treatment. Even though these patches have colorful decals on the front, it is possible to color them over with black magic marker or paint. This gives the effect of the pirate patch, but does not have the elastic band around the head.

3. Fogging

Frosting or fogging one lens of the glasses may make the patient more comfortable. Bangerter filters (neutral density filters) adhere to the lens like a Fresnel prism. They are available in a variety of strengths and may be removed easily, like the Fresnel lens. "Magic" tape on the lens works as well, but leaves an adhesive residue when removed. This usually comes off with rubbing alcohol or fingernail polish remover. Clear fingernail polish may also be used to blur one side, but this sometimes damages coatings that may have been put on the lenses. Any of the fogging options still leaves light entering from the side. Many patients with new onset diplopia are still bothered by this and need to have more total occlusion for comfort.

4. Close one eye and/or use a head position.

Closing one eye and/or using a head position is the easiest and most versatile. If the head position required to alleviate the diplopia is extreme, this may not be practical, but may work in some settings when the occluder or prism is undesirable. Many patients are under the misconception that occluding one eye will lead to blindness in that eye. They often simply need permission to close one eye when they are diplopic and reassurance that this is okay.

IF THE PATIENT NEEDS PRISM IN THEIR GLASSES, HOW DO I DETERMINE THE RIGHT POWER?

The ophthalmologist may wish to determine the right power; however, you can prepare them by taking a few simple steps:

1. Start with the measurement in primary gaze. After you have measured the deviation, hold up a prism that is close to the measurement you obtained and find out if it eliminates the diplopia.
2. Next, by experimenting with different strengths of prism, find out the least power that provides adequate relief of symptoms. You and the patient must realize that one prism is unlikely to provide binocular single vision in all gazes.
3. Find the amount of prism that gives single vision in a wide enough field of view for the patient.
4. If the deviation is both horizontal and vertical, you may be able to move the prism to an angle that corrects both directions. In this case, draw a line with marker on the lens along the base of the prism. This will allow you to repeat that angle when cutting a press-on prism for the patient. Once you have applied the prism, the marker line is easily removed with an alcohol wipe. Some lens cleaners are also good at removing the marker line, if alcohol is not easily available.

As described above, diplopia is a very disturbing symptom for patients and usually causes a great deal of anxiety until it is assessed and an explanation for the symptoms developed. Many times the diplopia will resolve on its own, but there may be a lengthy waiting period during which the patient is likely to still be symptomatic. The ophthalmic allied health professional must ask the correct questions of the patient, both during the triage stage and also during the preliminary testing in the office, to help the physician quickly and accurately assess the situation and develop a treatment plan.

This summary was designed to remove some of the mystery from the complaint of diplopia, so when you next encounter the dreaded phrase, "I see double out of my right eye," from Mrs. Skinner or any other patient, you'll be able to take care of her calmly. *No panic. No problem.*

CE on the Internet Quiz

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1. Which of the following patient complaints indicates a need for evaluation within the next few days, rather than within the next month?
 - a. gradual decrease in vision over the past 6 months
 - b. double vision in one eye when the other is covered, resolved by squinting
 - c. double vision that started suddenly and is resolved by covering either eye
 - d. favorite glasses just broke and the old ones are ugly

2. Which of the following are possible causes of monocular diplopia?
 - a. media opacities, such as a cataract
 - b. uncorrected refractive error
 - c. dry eyes
 - d. all of the above

3. What is the first question the ophthalmic allied health professional should ask when deciding when to have a patient evaluated for double vision?
 - a. you have health insurance?
 - b. does the double vision go away when you cover one eye or the other?
 - c. when was your last eye exam?
 - d. have you ever been to this clinic before?

4. When a patient describes sudden onset double vision with pain and nausea, when should the patient be evaluated?
 - a. within the same day
 - b. when the next available appointment appears on the schedule
 - c. at a time that is most convenient for the patient's out of town relatives
 - d. at the time of the next yearly eye examination

5. When the patient describes horizontal double vision that is worse when they are driving, which measurements are the most important to take?
 - a. measure in primary gaze, both at near and distance
 - b. measure with head tilt to the left and right
 - c. measure in up gaze
 - d. measure at near with +3.00 adds

6. When the patient describes vertical double vision, which measurements are the most important to take in addition to the primary gaze measurements?
 - a. measure with -2.00 lenses in the distance and +3.00 lenses at near
 - b. measure at near in up and down gaze
 - c. measure with and without glasses
 - d. measure in side gazes and on right and left tilt

7. When a patient describes horizontal double vision that disappears when they turn their head, which measurements should be taken?
 - a. measure on right and left head tilt
 - b. measure at near and distance and up and down gazes
 - c. measure with double Maddox rods
 - d. measure at distance in primary gaze, right and left turns

8. What of the following options are practical ways to eliminate diplopia?
 - a. occluder
 - b. Fresnel prism on one lens
 - c. "magic" tape on one lens
 - d. all of the above

9. What is the best way to determine the appropriate prism to apply to a patient's glasses?
 - a. measure the deviation in primary gaze and use that power of prism
 - b. after measuring the deviation, hold loose prisms in front of the patient and find the lowest power that eliminates the diplopia
 - c. choose the prism that you have most of in stock
 - d. after measuring the deviation, give the patient a prism with half that power

10. What cleaner works best to remove adhesive residue from spectacle lenses without damage?
 - a. lighter fluid
 - b. acetone
 - c. rubbing alcohol
 - d. water and dish soap

CE on the Internet Answer Sheet

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