SEEING THINGS DIFFERENTLY

EXPLORING VISUAL CHALLENGES BROUGHT ON BY STROKE

By Jon Caswell

Considering that the optic nerves from each eye travel the length of the brain, it's not surprising that there are many and varied ways stroke can affect the way survivors see. Vision deficits cascade into every area of a survivor's life. For instance, a person with a condition called visual midline shift may think the floor is tilted. The walls will also appear tilted, and the survivor will tilt his or her body to compensate. The visual system is telling this person that the world is at an angle, and the brain is making adjustments.

The occipital lobe at the back of the brain is our primary vision center, but all of the brain lobes receive visual information. "Almost every major area receives input from vision," said Dr. Carl Garbus, an optometrist at the Neuro Vision Rehabilitation Institute in Santa Clarita, Calif., and president of the Neuro-Optometric Rehabilitation Association, or NORA. "That means that a stroke has potential to create some visual deficits, such as poor visual memory, decrease in balance, decreased depth perception and reading problems, to name a few."

Both ophthalmologists and optometrists can diagnose vision problems, but vision rehabilitation is more likely to occur in an optometric practice.

'YOU MEAN I HAVE A LEFT ARM?'

Commonly called neglect, visual spatial inattention occurs when there is a stroke in the parietal lobe (between the frontal and occipital lobes), which carries our spatial map. With this condition the survivor may not pay attention to objects on the affected side – for example, food on the left side of a plate is untouched, or the left side of the face is unshaven. In some cases, the person doesn't even realize he or she has a left side. The brain is not processing information from the left side of the body very efficiently.

Dr. Carl Garbus

Rehabilitation involves learning to scan from side to side – finding items on a table and a wall, for instance. "We train at different distances and angles because the spatial world is vast," Dr. Garbus said. This deficit also affects the ability to judge space, so therapy may involve touching things at different distances. Prism glasses are special lenses that bend light, changing the direction it travels. Prisms have the potential to open vision to the neglected side and are used often in therapy. Other therapy procedures use a full-length mirror to help the person process information on the affected side.

"Spatial inattention training has to be done over and over to be successful," Dr. Garbus said. "The brain has to get continual stimulation to get better. Once a week wouldn't be effective; they would have to do it for several minutes at a time, five times a week, in order to improve."

Dr. Garbus recommends working with a doctor and then a therapist. "It doesn't work to send someone home with written instructions," he said. The patient needs to work with experienced therapists on a regular basis. It takes a therapist time to implement an effective program.

SEEING DOUBLE

Double vision usually comes from a stroke in the brainstem. With double vision, a person loses depth perception, and may get confused by what he or she sees. The quick fix for this is to patch one eye, but that doesn't fix the problem. It just reduces the visual information the brain has to process. But therapy may fix the problem.

"My first goal when I see a patch on a patient is to reduce the use of the patch and train the person to see single," Dr. Garbus said. But treatment requires accurate diagnosis, because there are

any therapeutic techniques that need to be considered. Does the eye turn out because of damage to a nerve that controls one of the six muscles in each eye? The location and cause of double vision can determine the type of treatment.

JERKY EYES

Oculomotor dysfunction occurs when the eyes can't track or move smoothly between objects. The eyes may make multiple stops as they track from object A to B; they may overshoot or undershoot the target. This condition often causes reading problems because survivors can't keep their place. They may skip over lines or may not be able to find where to go at the end of the line. It may affect walking because they can't scan the environment accurately, and thus they misjudge things. "The visual system fatigues very quickly with oculomotor problems," Dr. Garbus said.

This type of problem rarely gets better without therapy, and there is more than one type that fixes it. "I don't send patients home with one exercise," he said. "The patient must do several procedures, and there is a hierarchy of what is prescribed and when to administer treatment." Rehabilitation may involve tracking sheets where survivors have to find a particular letter in a line of letters. Another exercise requires the person to put a pointer or pen into a small circle to improve spatial localization skills.

RETURNING TO CENTER

Addressing the visual midline shift described above involves balance activities, training survivors to put more weight on the foot on their unaffected side. Therapists also use special prism glasses called yoked prisms that can affect spatial perception and body posture. "Sometimes we use yoked prisms only in therapy, but other times the prisms are prescribed for full-time use because a patient functions so much better with the prisms," Dr. Garbus said.

FIELD CUTS

A stroke can cause a lesion in the brain involving the optic nerve that results in a hemianopsia, commonly called a field cut. The person's visual field cut can be extensive, involving several areas in both eyes. This happens in both eyes because some nerve fibers from each optic nerve cross in an area behind the eyes called the optic chiasm and travel to the opposite occipital lobe. If the survivor also has neglect, that compounds the problem.

Scanning is a big part of rehabilitation. Reading can be a chore, and therapy may involve using a line guide or typoscope – a device that helps isolate the lines when reading. Some typoscopes have a color at the beginning of the line to help attract the eyes to the next line. Patients know they're at the margin when they see the color. "We often teach patients relaxation and breathing techniques because that helps them open up their visual field processing a little bit more," Dr. Garbus said.

These are the most common vision deficits among survivors. "Usually it's not just one thing but two, three or four things they are dealing with," Dr. Garbus said. "There is no cookbook on retraining deficits. It's a matter of getting a good diagnosis and a good treatment regimen from a physician who does this all the time." Rehabilitating vision improves results in other therapies, such as physical, occupational and speech. In the end the goal is to increase independence. SC

Editor's Note: *For more information and to locate a doctor or a therapist, visit the NORA website at* ***www.NORA.cc****.*

WHAT DO SURVIVORS SEE?

These artist's renderings depict some of the common vision deficits experienced by stroke survivors.

NORMAL VISION

VISUAL SPATIAL INATTENTION

Usually associated with a stroke in the parietal lobe of the brain

DOUBLE VISION

Usually associated with a stroke in the brainstem

OCULOMOTOR DYSFUNCTION

Characterized by an inability to smoothly track one's vision

HEMIANOPSIA

Usually associated with a stroke that causes injury to the optic nerve