Test for Dizziness a Real (V)HIT

By Joelle Klein

Many audiology patients are surprised to learn of the connection between the eyes and the ears when it comes to balance and dizziness issues. But it’s an intimate connection, says Kathleen Zaccaro, a clinical audiologist at University of Colorado Hospital for the last 23 years.

“They don’t understand why we’re looking at their eyes when it’s really the ears we care about. But that’s the only way we can look at the inner ear, is through the eyes, because they’re connected, to keep us balanced,” Zaccaro explains.

And looking at the eyes in relation to the integrity of the inner ear canals is exactly what the new Video Head Impulse Test (VHIT) examines in patients who complain of dizziness. The test uses a device – the only one of its kind in the region – that looks sort of like Google Glass, with a set of goggles and an infrared camera attached on the right. The goggles are connected to a monitor that tracks the vestibular ocular reflex (VOR), or the way the eyes move in relation to the movement of the head.

For example, the eyes of person with normal VOR that are fixed on a target move to the right as his or her head moves to the left. In a patient with a VOR impairment, the eyes move in tandem with the head, requiring a “catch-up saccade,” or corrective eye movement, to return to the target.

That catch-up causes dizziness, but saccade is not usually apparent to the human eye. The VHIT not only captures these small movements, it can also determine which of the three inner ear canals is diminished or impaired and therefore causing the saccade. Prior to this test, clinical audiologists could only test one of the inner ear canals at a time with the equipment available.

Inner workings. The VHIT, which has only been available at UCH for six months, has enabled audiologists to get a more complete picture of activity in the inner ear canals than ever before.

And with that information, otoneurologist Carol Foster, MD, director of the UCH’s Balance Laboratory, can better diagnose and treat patients suffering from anything from slight balance issues to severe and debilitating dizzy spells.

“We can tell exactly what your ear is doing. Before it was mostly a black box,” said Foster.

Limited options. When Zaccaro first started working at the hospital performing vestibular tests to determine the sense of balance and orientation in patients complaining of dizziness, she had only the videonystagmography (VNG) machine at her disposal.

“It was limited because we could only look at one structure of the inner ear that sensed horizontal motion,” explained Zaccaro. She and her colleagues couldn’t look at other structures, including two gravity sensors and the posterior and anterior canals.

The VNG test is also unpleasant for the patient. It entails pouring liquids of different temperatures into both ears to pick up a reflex in the eye called nystagmus. It’s designed to cause dizziness, and it often results in nausea.

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In 2000 a new machine and test, called vestibular evoked myogenic potential (VEMP), enabled audiologists to test the integrity of gravity sensors in the inner ear. Still, audiologists had large gaps in their abilities to figure out what was going on in the inner ear canals. “There could be an injury to one of those canals and we wouldn’t know about it,” said Zaccaro.

With the VHIT, audiologists can test all three canals for the first time and make diagnoses and prognoses with more certainty. The VHIT won’t replace the other two older tests, though, Zaccaro said. It doesn’t pick up milder losses in the horizontal canal as well as the VNG does, and the VEMP tests the gravity sensors, which the VHIT does not.

Quick and painless. The VHIT test is quick and simple, as Zaccaro demonstrated recently. She first puts the space age-looking goggles on her patient and asks him or her to focus on a spot on the wall. Then she rotates the head to the left and to the right, very quickly, asking the patient to try to stay focused on the spot. Next, she puts her hand under the patient’s chin and on top of the forehead and moves the head up and down quickly.

“We’re looking for how fast the eyes move,” Zaccaro explained. “If the ears can’t pull the eyes fast enough, then things will get blurry.”

The painless test takes about 10 minutes and can even be done on young children.

“In children we’ve always had trouble testing the inner ear because we can’t stick water in their ears. They start crying,” Foster said. “But because [the VHIT] uses totally natural movements, we can do this even with babies, and that widens the group of people who can be tested.”

Only patients with neck issues or stiffness can’t tolerate the VHIT. Fort Collins resident Stephen Dragan has suffered several severe vertigo spells over the last four years and has had the VNG and VEMP tests. He experienced the VHIT for the first time when he came to UCH this month for additional examinations. Dragan said the test, performed by Zaccaro, was extremely easy, painless and did not make him uncomfortable or dizzy.

“It was a very short test with nothing for me to do except to try and keep focused on a dot on the wall. It seemed easy since the person performing the test did most of the work,” he said.

The VHIT is also a valuable addition to vestibular research. Prior to its availability, researchers recorded eye movements with wire coils, attached to contact lenses, that snaked out over the eye. These “search coils” were painful, expensive and difficult to use.

“For years research has been done with these coils. But now that we have the VHIT, which is completely painless with no risk to your eyes, we don’t have to use [them],” Foster said.