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Doctors Test New Weapon Against Eye Disease That Strikes Preemies

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Thomas Lee painstakingly scrapes away spider-web-like tentacles deep inside a premature baby's eye, scar tissue that is pulling apart the infant's retina.

"It's like you're peeling back the layers of an onion," the surgeon, of Children's Hospital Los Angeles, says in describing a mysterious disease's damage to the baby's eye.

Now a few doctors around the country are testing a new tool that enables them, for the first time, to watch how this disease that blinds hundreds of premature babies every year begins its sneak attack behind their tiny eyelids. It is technology that offers hope of one day helping to save more children's vision.

Already the researchers are astonished to learn how much damage this disease -- called retinopathy of prematurity, or RoP -- can do before today's standard preemie eye exams signal a reason to worry.

"We can see just amazing things in these young children's eyes that we never suspected," said Cynthia Toth of the Duke Eye Center.

New understanding of this eye disease is crucial. About 16,000 premature babies a year get some degree of RoP, and the number is rising. The smaller the preemie, the bigger the eye risk, and doctors are saving more and more of the estimated 28,000 babies a year who are born weighing 2 3/4 pounds or less.

RoP can destroy the retina, the eye's innermost layer. Mild cases can resolve on their own, but there is no sure way to save vision once aggressive RoP strikes. Laser therapy decreases but does not eliminate the chance of blindness, and many babies who do not go blind still experience severe vision loss.

If the laser therapy fails, scar tissue can cause the retina to detach -- but removing that tissue is risky, because a slightly wrong move can cost vision. Hence the quest to diagnose sooner which babies are getting into trouble, and to determine when and how to intervene.

Step 1 of the preemie research uses a technology called optical coherence tomography, or OCT, which beams light to create a map of the back of the eye, showing the retina's layers in exquisite detail. In recent years, eye doctors have begun offering this exam to adults, who rest the chin in a big machine that directs the light into their eyes. That is unusable for babies, so Lee and Toth are testing a new handheld high-definition version, from North Carolina-based Bioptigen. Doctors just swaddle the preemie and hold the scanner over the eyes for a few minutes.

Step 2: In Los Angeles, Lee uses the OCT images to help decide which preemies need surgery -- and then cuts away the scar tissue using a special endoscope, an ultra-thin probe from New Jersey-based Endo Optiks that lets him see behind the iris, deeper than standard surgical microscopes.

"Trying to look into an eye that has RoP and operate is like driving on a highway right behind a tractor-trailer with only five feet between the two of you at 70 miles per hour. If your view is not good, it's like driving in the rain with the windshield wipers off with the same truck in front of you," Lee said.

The question is whether either of the tools helps -- by diagnosing babies in trouble sooner, or by improving the eye surgery's precision. It is far too soon to know.

But the OCT images are uncovering damage that specialists who examine the babies' eyes using standard magnifying lenses couldn't see, said Lee, who presented preliminary data at a recent eye meeting.

This scar tissue forms in strands that appear, in Lee's scans, much like spider silk but pull with remarkable force. Retinas that doctors thought were lifting only on the edge often already have damage in their crucial centers, he said. More surprising is that eyes that passed standard exams can have retinal layers literally stretching apart until they tear. Even if the retina does not detach, vision is lost because those layers lose the ability to properly pass information entering the eye to the brain.

"The doctors, including me, we just don't see that" damage with standard tools, said Duke's Toth. "It's something we hadn't realized was much more widespread, and [happens] much earlier, than we thought."

But Toth gives parents a big caution: Discovery of unexpected damage does not necessarily mean it is time to operate. Some types may clear up. That is why the scans are research tools, to learn how RoP behaves.

"Does that mean we go in earlier or wait for a while? It's still too early to know," said Mary Elizabeth Hartnett of the University of North Carolina at Chapel Hill, a doctor who is not involved in the research but has seen Lee's data and calls it promising. "The stakes are high when you're operating on these little infant eyes."