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Surgical Technique Effective for Treating Corneal Edema

Going under the knife to relieve a swelling might seem a bit extreme. But when that edema is in a horse's eye, researchers have determined that a surgical procedure can, in some cases, successfully decrease the swelling and help that animal retain vision and live comfortably.

For a horse to see well, all layers of the cornea—the transparent layer that forms the front of the eye—must be free of cloudy or opaque areas. A healthy cornea is a clear and relatively dehydrated structure. When fluid accumulates in the cornea, however, swelling and a bluish haze appears. This condition is called corneal edema.

"There are many reasons for corneal edema," explained researcher Nikki Scherrer, DVM, ophthalmology resident at the University of Pennsylvania School of Veterinary Medicine's New Bolton Center. One of those is endothelial disease.

The endothelium is one of three layers of the cornea; specifically, it's the thin innermost layer that plays an important role in keeping the cornea clear. When the endothelial cells are missing or not functioning correctly, fluid can move from the inside of the eye into the cornea, creating edema.

Traditionally, veterinarians have used a combination of topical and systemic medications to treat corneal edema caused by suspected endothelial disease. If the edema does not respond to these treatments, veterinarians can perform a surgical procedure aimed at improving patient comfort and allowing the animal to maintain some vision.

Scherrer said the surgery combines a superficial keratectomy—in which the surgeon removes the top layers of the cornea—and a Gundersen inlay flap. The Gundersen inlay flap technique involves placing a flap of conjunctiva—the pink tissue that surrounds the eye—over the keratectomy site where tissue has been removed.

"We think that the conjunctiva acts like a sponge to pull water out of the cornea," she said.

Scherrer and colleagues recently set out to determine whether the procedure could reduce corneal edema, reduce ocular pain, eliminate associated recurrent corneal ulceration, and improve vision in horses with corneal edema caused by suspected endothelial disease.

Scherrer evaluated four horses that underwent this procedure and collected follow-up information at three, six, 12, and 15 months after surgery. She determined that each horse was comfortable, had less corneal edema than before surgery, had no corneal ulcers, and retained vision.

"I was surprised by how comfortable these horses stayed years down the road," she said.

The team ultimately concluded that the superficial keratectomy and Gundersen inlay flap procedure can provide a surgical alternative to long-term medical treatment of severe corneal edema in some horses.

"There are new procedures being tried all the time, and some of them can be quite successful," Scherrer relayed. "If a condition seems like it is not improving (with traditional treatment options) consider referral for additional options."

The study, "Corneal edema in four horses treated with a superficial keratectomy and Gundersen inlay flap," will appear in an upcoming issue of *Veterinary Ophthalmology*.