Cory, my feisty off-the-track Thoroughbred, is all sparkle and spice. Normally, he can gallop the length of a 20-acre hay field without drawing a deep breath. But one day he started huffing and puffing at an easy canter. I had to push him forward instead of holding him back, and his whirl-buck-bolt quotient dwindled. He was less spunky in his paddock, his coat was a little dull, and he was a tad underweight for his 17.1-hand height.

Worried, I asked Jeffrey Warren, DVM, an equine veterinarian in the Rocky Mountains for 40 years, to investigate. Warren listened to Cory’s heart and lungs, palpated his larynx and jugular vein, assessed airflow and discharge from his nostrils. Finally, he listened to Cory breathe at work and at rest.

All signs pointed to laryngeal hemiplegia (LH), a disorder commonly known as “roaring” because of its main sign—heavy, raspy breathing. If your Latin’s rusty, LH refers to half paralysis of the larynx. Located at the throatlatch, a horse’s larynx allows air to enter his windpipe. Cartilage on either side of the larynx opens when the horse inhales and closes as he exhales.

The surgery to correct laryngeal hemiplegia—roaring—is safe and effective. But it’s scary when it’s your horse under the knife.
LH occurs when cartilage on one side of the larynx cannot open. Often the paralyzed cartilage is sucked inward on inhalation, further obstructing the airflow. In severe cases, the resulting dynamic endoscopy can be heard from across an arena. Because the horse cannot get enough oxygen, another sign of LH is poor performance—abnormal fatigue when exercised, resistance to flexion and reluctance to work.

Warren recommended a resting endoscopy to look at Cory’s larynx. For the procedure, a long tube capped with a light and camera is threaded up the horse’s nasal passage. The camera transmits images to a computer screen, where you can watch the larynx open and close as the horse breathes. The test continues while the horse is standing quietly, after he swallows and opens and closes as the horse breathes.

The resting endoscopy showed that the left side of Cory’s larynx didn’t even flutter when he breathed; it just hung there blocking half his airway. LH is graded from 1 (normal breathing) to 4 (total paralysis), and Cory had Grade 3, which meant his breathing ability was reduced by 50 percent when he was standing still. We live at 6,500 feet elevation; there’s barely enough oxygen for any of us up here, even at full intake. No wonder the big fella was tired.

Perhaps in solidarity with my horse, my larynx felt tight. At last, we arrived at CSU’s James L. Voss Veterinary Teaching Hospital, a facility that treats all animals, from abyssinians to zonkeys. A gang of alpacas greeted Cory with the collective stinkeye as he unloaded. He blew in response but stepped into the equine breezeway with his dignity intact.

I met Eileen Hackett, DVM, PhD, who would be doing Cory’s surgery. An eventing rider who did her internship in Lexington, Kentucky—the heart of Thoroughbred country—Hackett told me she finds soft-tissue surgery “challenging and rewarding. Great mentorship in my early career gave me a deep appreciation and love for this specialty.” I knew Cory would be in good hands.

But before surgery there was one more step: dynamic endoscopy, in which the horse’s larynx is viewed while he works. Half of horses with intermediate grades of LH produce normal resting endoscopies. As many as 56 percent show multiple abnormalities on dynamic evaluation, requiring different surgical techniques. Some horses with LH never roar, and some roarsers do not have LH. Hackett explained, “The dynamic endoscopy has really been a game-changer for us. It helps us to understand each horse’s specific problem, and then we can tailor the treatment for that.”

Dynamic endoscopies can be done on a treadmill while the horse gallops toward a stationary handler. But this unnatural process excludes the rider’s weight, ignores issues of footing and tack, discourages flexion and precludes changes in direction or pace—all factors that alter breathing.

Overground dynamic endoscopy is today’s money shot. It is conducted without sedation while the horse is ridden. My eyebrows rose at the idea of riding a hot horse with a scope inside his face. Cory, for all his good qualities, is high-strung and oversensitive. Without sedation, nobody gets a needle near his legs, let alone a foot-long tube up his nose. I voiced my concern to Hackett and we came up with a plan.

With my permission and under Hackett’s supervision, Cory was twitched and the nasal tube inserted. The other end of the tube was fastened to a saddle-pad transmitter that sent a wireless signal to a computer screen. Then I climbed into the saddle. To my surprise, Cory performed like a gentleman at all gaits. But his breathing brought to mind an obese smoker climbing a 14,000-foot peak.

The results verified Warren’s diagnosis of Grade 4 laryngeal hemiplegia. Hackett walked me through the video, placing a ruler down the throatatch, a horse’s larynx allows air to enter his windpipe. Cartilage on either side of the larynx opens when the horse inhales and closes as he exhalas. In laryngeal hemiplegia, one of the cartilages cannot open, obstructing airflow.

Located at the throatatch, a horse’s larynx allows air to enter his windpipe. Cartilage on either side of the larynx opens when the horse inhales and closes as he exhales. In laryngeal hemiplegia, one of the cartilages cannot open, obstructing airflow.
of permanent sutures to hold the prosthetic laryngoplasty, the installation along: Cory was a prime candidate for owner compliance, recovery procedures material, variations in technique, use, definitions of success, prosthetic depending on many factors: breed, vary from 5 percent to 95 percent, Success rates for the procedure refinements for the last 125 years. With each breath, the paralyzed function normally, opening and closing movements like bees to a hive. A plastic square inches lies the machinery oxygen and anesthetic into his airway, tube the size of a drainpipe pumped opening and retreating in quick approaching and retreating in quick movements like bees to a hive. A plastic tube the size of a drainpipe pumped oxygen and anesthetic into his airway, and the endoscope was threaded up to the larynx. Hackett could see her maneuvers magnified onto a computer screen as well as through the four-inch incision she carved into Cory’s throat. The delicacy of the larynx’s location cannot be overstated. Within two square inches lies the machinery for breathing, eating, drinking and circulating blood between heart and brain. The arytenoid cartilage is buried in soft tissue, and the cricoid cartilage takes different shapes among individual horses, so surgeons never know exactly what they will find. The prosthesis must manipulate every breath the horse takes for the rest of his life, sleeping or racing, tranquil or hysterical. That’s about 20 years, given that most larynxes are corrected before maturity. Prosthetic sutures undergo forces of 10 pounds per swallow—and a calibrated the tension on each suture, observing from multiple angles, testing and retesting. When she was satisfied, she replaced various tissues, then stitched the inner and outer sides of the muscle in Cory’s throat. Finally, she sutured the skin closed. The cutaneous stitches would be removed in two weeks; the inner and outer subcutaneous stitches would dissolve. The royal blue prosthesis will breathing noise that can persist after a prosthetic laryngoplasty. He would still be able to whinny using the intact vocal cord on the right side of his larynx. So two days after his primary surgery, Cory the Brave stepped into the stocks for an endoscopic laser ventriculocordectomy. The computer screen showed his handsome new larynx as well as the vocal cord that dropped across it. Through the endoscope, Hackett and her team inserted the long flexible tip of their diode laser, a tool that has revolutionized human and animal medicine. Watching the endoscopic screen, surgeons laser tissue out of internal areas without external incisions or general anesthesia. As Hackett separated the vocal cord from its moorings with her laser spark, smoke seeped from Cory’s nostrils. I’ve heard difficult horses called “fire-breathing dragons,” but this was a first. “Couldn’t the vocal cord have been removed while Cory was under general anesthesia to rebuild the larynx?” I asked. “Yes,” Hackett said with a twinkle in her eye, “but we didn’t want to blow him up.” She explained that inhalant anesthesia contains flammable oxygen. And the laser spark … Aha. Tense until that point, we all laughed in comic relief at my inadvertent suggestion of blow-torching Cory’s throat. Vocal cord tissue is tough, requiring a tight hold and an hour of laser ablation. In the end, Hackett fished out a lump of tissue about a quarter-inch wide and an inch long. It looked like raw steak with a line of gristle down one side.

TIME TO GO HOME
After a week of hospital care, Cory was released. The final bill came to $2,796, including unexpected costs for a near-colic following general anesthesia. Both of us were tired, hungry and weak. Hackett told me that Cory must eat from ground level for the rest of his life. This reduces the chance that he will inhale particles of food through the open larynx and into his lungs. Irritants like dust and ammonia must be avoided. For the next six weeks, he would need multiple medications several times daily and would have to be kept in a stall and hand-walked slowly for 10 minutes twice a day. I explained that “the area needs time to heal and scar down to become secure.” She added that quiet recovery prevents complications related to anesthesia, surgical location and the size of the prosthesis. All of which sounds great, but keeping an off-the-track Thoroughbred calm is like telling a bird not to fly. I explained that

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Specifically, the arytenoid cartilage that opens and closes the larynx is stitched to the cricoid cartilage, creating a fixed opening on the left side. The arytenoid cartilage on the right side continues to function normally, opening and closing with each breath. First attempted in 1893, prosthetic laryngoplasty has undergone refinements for the last 125 years. Success rates for the procedure vary from 5 percent to 95 percent, depending on many factors: breed, use, definitions of success, prosthetic material, variations in technique, owner compliance, recovery procedures and rehabilitation methods. But and wide open, seeing nothing. I watched as the surgeon, residents, technicians and upper-level veterinary students prepared his body, their hands approaching and retreating in quick movements like bees to a hive. A plastic tube the size of a drainpipe pumped oxygen and anesthetic into his airway, and the endoscope was threaded up to the larynx. Hackett could see her maneuvers magnified onto a computer screen as well as through the four-inch incision she carved into Cory’s throat. The delicacy of the larynx’s location cannot be overstated. Within two square inches lies the machinery for breathing, eating, drinking and
Something fishy about the Larynx

When Jeffrey Warren, DVM, suspected that my gelding, Cory, had laryngeal hemiplegia, he scheduled an endoscopy to examine the horse’s airway and told me something puzzling. If there was a problem with Cory’s larynx, he said, it would almost certainly be on the left.

The predictive power of veterinary science is impressive, that’s like identifying the digestive location of a colic which side of the larynx would be paralyzed? He launched into an answer below the poll, controls breathing by signaling the larynx to open and close. As a result, it grew longer. In today’s horse, this nerve travels length and large diameter, this “fish” nerve can be injured by hyperextension of the neck. Warren reminds folks to ease up on those lateral carrot stretches—flexibility is fine, but don’t overdo. Occasionally the nerve is damaged by lead, plant or chemical poisoning that smaller nerves can withstand. Infection of the jugular vein can harm laryngeal nerves, too. But almost always, run comes from within. As a result of the recurrent nerve’s unusual length, it takes 26 percent longer for an impulse to travel from brainstem to larynx on the left side than the right. This means the left nerve shoulders a greater burden to synchronize the opening of both sides of the larynx. As a result, the axon, or transmission fiber, of the nerve decays like overused copper in an electric wire. Recurrent short eventually cause enough damage that impulses cannot reach the muscle on the left side.

Warren finished his tale and gestured toward the enormous horse standing next to us, “So it all started when Cory was a fish.”

“Excitable” is Cory’s middle name, glancing toward him as we talked. There he was, a gentle giant rooted in his hospital stall, regarding us with the soft eyes of equine forgiveness, the epitome of Zen. But Hackett smiled in understanding and said, “Just do the best you can. We see everything under the sun as far as activity. Some of it is intentional, which is the kind of activity that makes me cringe the most.” Cringe-worthy activity includes riding the recovering horse, exposing him to turmoil, giving him freedom to run, or chasing him around to see if the surgery worked. Apart from such foolishness, Hackett recognized that animals sometimes react in ways that humans cannot prevent.

THE STOPOVER

Cory and I headed for home with an eight-hour drive through the Rockies on the first day. Already worried about transporting a sick horse, problems expanded in my mind. Every turn was too tight, every downhill too steep, every stop I expected to see my horse strangling on the one mose of hay that I missed when vacuuming the manger. We rounded blind curves that I missed when vacuuming the manger. We rounded blind curves only to encounter elk in the road, tourists snapping photos on highway centerlines, oncoming traffic in our lane. As my cursing became more inspired, the cab of the truck glowed as blue as Cory’s prosthetic sutures. And so, it was a huge relief to reach our overnight spot near South Fork. Full of open meadows and golden aspens in twilight, the ranch is backed by Wolf Creek Pass all silted with snow. The ponds were large, quiet horses stood nearby, and the pipe fencing was safe. Maybe, I thought, we’ll finally get a good night’s sleep.

Then I spotted the footing—the
entire pen was mired in manure. Even the owner blanched when she learned that Cory was sporting a week’s worth of needle holes and a cut throat. I explained that he must eat from ground level. She gestured weakly to a barrel feeder about waist-high. He had nowhere else to stay, so I shoveled a clean circle of ground for hay and hoped that the armory of antibiotics in Cory’s body would do its job. I then headed for the nearest motel.

When I returned at dawn, two horses were galloping in the distance. Oh, no. Cory and a cute mare who arrived in the night were racing each other along the fence line. I finally managed to get hold of him. He was sweating and shivering, flanks heaving with exertion and excitement. This was far from the “sterile” and “calm” environment in which my horse was supposed to receive his morning medications. It wasn’t even the first thing that had gone wrong that morning: At the motel, I had shaken Cory’s sulfa pills with water in a syringe held shut with my thumb. Goop spewed out all over the sink and down both arms. Severely allergic to sulfa and cognitively exhausted, I had reasoned that it was OK if I died because somebody would come and get Cory.

In a moment of clarity, I realized that my resolve was doing more harm than good. Warren had already offered to help with medications once we were home. I flung the syringes into the truck, angry at myself, loaded Cory and climbed into the cab, emotionally spent and speckled with Banamine paste, sulfa slop and throat spray.

Hackett and Warren were alarmed when they heard even the condensed version of Cory’s antics. Warren had seen Mr. Zen’s propensity for explosion firsthand and agreed that we must provide an artificial means of quieting him for the next six weeks. Hackett recommended valerian root over long-acting pharmaceuticals.

SUCCESS: Cory, shown with his owner, Janet Jones, has fully recovered. The photo of the pair jumping (right) was taken 11 months after his larynx surgery.
RECOVERY AND RESTORED HEALTH

Most horses cough while eating and drinking as they adapt to an open larynx. Such coughing is usually harmless, though pneumonia can develop from chronic aspiration. Cory’s coughs diminished over the first two weeks. Soft rapid coughs after drinking lasted longer and still occur occasionally. A ground-level water trough helps.

As predicted, keeping a postoperative horse calm is the biggest challenge. A good supply of grass hay or a ground-level slow feeder gives the horse something to do. Stable him near quiet familiar buddies. Routine is comforting, so set a schedule for daily activities. Finally, find qualified help. The demands of major equine surgery and recuperation are ruthless.

Six weeks after surgery, we stopped the valerian and Cory revved his engines within 24 hours. Warren conducted a follow-up endoscopy—unsedated, so let’s just say it involved white knuckles and pale faces—and texted a video of Cory’s larynx to Hackett. Both veterinarians were pleased with the outcome. The laryngeal opening had relaxed slightly, as expected, and there was no sign of inflammation or infection. The prosthesis was intact despite our melee in South Fork.

We began rehabilitation, increasing hand-walks and working up to longer sessions. Lack of exercise always causes tissue to weaken—even bone takes a hit—so I turned up the dial very slowly to prevent injury. No one wants to put a horse through major surgery only to see him pop a tendon. If rehab goes well, it will be six months before Cory is jumping courses again. Today, his coat shines, his eyes are bright and the whirl-buck-bolt quotient is waxing, to my simultaneous joy and dismay.

Hackett emphasizes that new developments make prosthetic laryngoplasty less risky and more effective all the time. To reduce the risk of general anesthesia, Norm Ducharme, DVM, pioneered a standing version of the surgery that requires only sedation. Eric Parente, DVM, initiated the use of ankylosis to stabilize the joint from which the laryngeal cartilage extends. Ankylosing involves roughing up the joint chemically or mechanically so that it heals with arthritic stiffness, making the prosthesis more stable.

Jonathan Cheetham, PhD, is working on nerve grafts and laryngeal pacemakers. In grafting, nerve growth factor is applied to laryngeal nerve to encourage it to regenerate. This technique requires 16 to 20 weeks of recuperation, too long for many racing Thoroughbreds. Still, it holds promise for further development. Laryngeal pacemakers involve implanting an electrode that stimulates contraction of the cricoarytenoid muscle. This contraction allows the muscle to move the cartilage that opens and closes the larynx.

Laryngeal hemiplegia can be corrected at relatively low cost and with frequent success. If surgery is not an option, Warren asks owners to remember that an untreated roarer is “capable of living a useful life and does not need to be euthanized. Instead, have compassion for the animal and change your expectations to allow the horse an easier life.” A roarer can’t race or jump or spin any longer, but he can still walk on flat trails, pony young horses or teach beginners to ride.