# University of Pretoria veterinary specialist performs what is believed to be SA’s first neuroprosthesis on a horse

Posted on **May 28, 2021**

UP's Dr Juan Muñoz.

A University of Pretoria veterinary specialist has performed what is believed to be the first dynamic neuroprosthesis on a horse in South Africa.

The patient, a two-year-old racing filly, suffered from respiratory noise and exercise intolerance secondary to a laryngeal hemiplegia, which is one-sided paralysis of the larynx. Dr Juan Muñoz, senior lecturer in the Department of Companion Animal Clinical Studies at the Faculty of Veterinary Science, and Dr Felipe Corrêa, equine surgery resident, used a new technique to treat the horse.

The larynx consists of a group of cartilages that allow air to pass into the trachea. Horses with laryngeal hemiplegia present a progressive paralysis of one of these cartilages, normally the left arytenoid, due to lack of innervation, causing atrophy to the cricoarytenoid dorsalis muscle that moves this cartilage. The paralysis prevents the cartilage from opening the throat during inspiration. This leads to decreased airflow into the lungs due to obstruction from the paralysed cartilage, resulting in respiratory noise and exercise intolerance. Horses with this disease are called “roarers” because they make a characteristic respiratory noise that sounds like “roaring” when exercised.


*Dr Elza Hollenbach, Dr Felipe Corrêa and Dr Juan Muñoz conducting an endoscopy.*

“This filly was not able to participate in horse racing due to the presence of a laryngeal hemiplegia in an early stage of the disease. In more severe cases or when the pathology is bilateral, patients are unable to exercise or can even die because of asphyxia,” explained Dr Muñoz. The patient was brought to the Onderstepoort Veterinary Academic Hospital as it had a respiratory noise. An overground dynamic endoscopy was performed that revealed a grade 3/4 left side laryngeal hemiplegia. Overground dynamic endoscopy is the gold standard imaging technique to diagnose airway problems that occur when a horse is exercising, as some conditions will only be seen with the horse moving at speed. This procedure is performed by inserting an endoscope into the horse’s nasal cavity to visualise the pharynx and larynx area. The horse is then exercised and the data is recorded in a computer located underneath the saddle. Playing the video back in slow motion allows visualisation and assessment of the functioning of the pharynx and larynx.

Classically, horses with laryngeal hemiplegia are treated by laryngoplasty and ventriculocordectomy under general anaesthesia. With the laryngoplasty, the paralysed cartilage is “tied back” into an open position with a suture through an incision in the throat latch area. The suture acts as a “prosthetic” for the paralysed muscle. With the ventriculocordectomy, the ventricle and the vocal cord of the larynx are removed to widen the airway and reduce or eliminate the respiratory noise. The laryngoplasty is a nonphysiologic procedure and is associated with complications such as chronic coughing or dysphagia.

*The horse being prepared for surgery.*

In cases diagnosed in the early stage of laryngeal hemiplegia, the cricoarytenoid dorsalis muscle is not completely paralysed and therefore can be reinnervated with other healthy nerves from the neck to restore normal innervation and functionality. This particular filly was in an early stage of the disease (grade 3 out of 4) and was treated with a combination of the above-mentioned techniques – what is called a “dynamic neuroprosthesis technique”. The laryngoplasty (tie-back) was modified by placing a prosthesis with an anchor screw and metallic button, and the reinnervation of the cricoarytenoid dorsalis muscle was performed with the C1-C2 cervical and accessory nerve. The ventriculocordectomy was performed with laser surgery under endoscopic control thus avoiding direct incision into the larynx (the classic technique). The surgery was performed with the patient in a standing position with sedation and local anaesthesia, thus avoiding the risk and cost associated with general anaesthesia, such as prolonged recovery, orthopaedic injuries, myopathy or neuropathy.

This new approach is more physiologic and is associated with less potential complications when compared to the classic laryngoplasty procedure. This technique was first described last year by Dr Norm Ducharme from Cornell Veterinary School (USA) and Dr Fabrice Rossignol from Grosbois Equine Clinic (France), but Dr Muñoz said that it is, to their knowledge, the first case treated with this modified technique in South Africa and probably on the African continent.

He added: “The procedure went well, and the recovery time will be around three months before the filly returns to racing.”

Professor Amelia Goddard, Head of the Department of Companion Animal Clinical Studies, said that in recent months there have been several breakthroughs in her department that were firsts for South Africa. This includes life-saving heart surgery on two dogs by the department’s Dr Adriaan Kitshoff and Dr Ross Elliott who used a ground-breaking approach that entails dilating the opening of a heart valve with a balloon. In addition, Dr Elge Bester and Dr Kitshoff conducted South Africa’s first partial knee replacement on a cat. “This shows that our academics have world-class expertise and are comparable with the world’s best veterinary scientists,” Prof Goddard said.

Published by Hlengiwe Mnguni