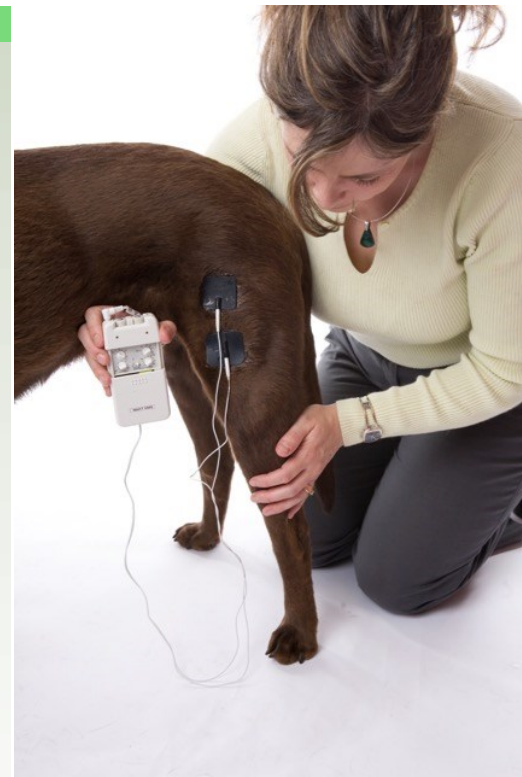




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Peripheral Nerve Injury Issue

Winter 2020

This issue delves into the treatment of peripheral nerve injuries, (aka lower motor neuron lesions). This encompasses damage in the nerve root or any portion of the nerve(s) there-after. Damage can come in the form of trauma, traction, inflammation, compression, or occasionally after surgery. These are interesting cases to treat. Typically, the cases we see at The Canine Fitness Centre are neuropraxia cases (when the nerve is crushed, tractioned, inflamed, or mildly damaged in some way but the nerve sheath and inner fibres are intact). These cases can do well if we can address the root of the problem.

Sometimes, we see axonotmesis cases. These are cases where the nerve sheath is intact, but there nerve fibres within the sheath are severely damaged. These cases are trickier because they can take a little longer to heal, and in the initial stages they might present just like a fully severed nerve (neurotmesis). Functional electrical muscle stimulation is a useful tool to give clues about the state of the nerve. It can also be used as a rehabilitation tool. In the case of an axonotmesis as the nerve begins to regenerate, a muscle contraction can be achieved with our neuromuscular electrical stimulation units. It can be a slow process. Peripheral nerves regenerate at the speed of 1mm / day (or 1 inch / month).

This newsletter presents case studies on peripheral nerve injuries and their path to recovery, as well as some interesting information on lick granulomas as a sign of a peripheral nerve injury. Please read on!!

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Treatment of Peripheral Nerve Issues

Margaret Kraeling, PT, CCRT

CFC News Winter 2020

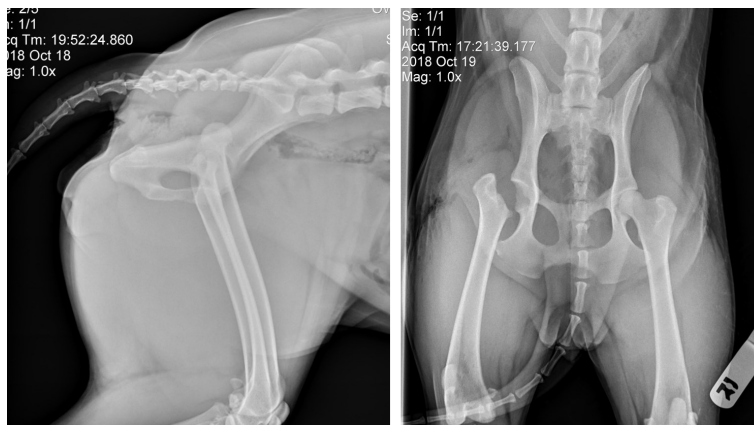
A recent case in the clinic was a 4-year-old spayed female medium sized mixed breed who was hit by a car. She sustained a craniodorsal luxation of the hip as well as a femoral head fracture. She subsequently underwent a femoral head ostectomy. Bella was seen for an initial assessment at three days post-surgery. At that time, she would rest her right hind (RH) foot on the floor when standing but otherwise was non-weight bearing. She was on meloxicam and gabapentin at the time. Proximal thigh girth was 35 cm on the RH and 38 cm on the left hind (LH). The right hind was able to go to $\sim 140^\circ$ however she appeared to be very painful with the movement. She also was very sensitive to touch at any point along the leg including lower leg and foot. Initial treatment was with PEMF (pulsed magnetic field), super pulsed laser and early stage exercises – leg extension and weight shifting. Treatment plan was for twice weekly sessions of rehab for two weeks prior to trying the under water treadmill (UWT).

There was very little change over the next week and it became apparent that Bella was making no attempt to actively flex the tarsal joint or extend the toes on the RH. I was able to elicit a quads reflex but not a cranial tibial reflex. I was not able to elicit a contraction of the cranial tibial / digital extensors with the E-stim and she appeared extremely uncomfortable to the sensation from the pads.

At this time, laser was added not only to the surgical site but also along the path of the sciatic nerve. E-stim was used with an increased pulse width of 300 microseconds which she found more comfortable and could obtain contraction with two small pads placed over either end of the muscle.

The lack of control in the right tarsal joint made the UWT a poor choice at this time so Bella began sessions twice a week in the infinity pool swimming against the current. She gradually began to use the right hind more to kick improving leg extension, tarsal joint control and holding the foot in extension posture of the toes. During this time Bella was fitted for a dorsi-flex assist boot primarily to protect the RH foot while on outdoor walks. As Bella began to place the right hind more consistently for walking the dorsiflex then became more useful.

By seven weeks post-surgery the contraction of cranial tibial muscle using the E-stim was much improved using a lower intensity and no longer eliciting an overflow to the digital flexors. Walking distance had increased, and she had gained 2 cm in thigh girth. Bella was also placing the RH consistently at a slow walk for 13-16 steps in a row



Before surgery

After surgery


Treatment of Peripheral Nerve Issues Continued...

By four months post-surgery Bella was able to actively control tarsal flexion and digital extension. We were able to elicit a normal deep tendon reflex of the cranial tibial muscle and she was within 2 cm of the LH in thigh girth. Her activity level had returned to normal including hill work to further strengthen the right thigh.

The research shows that laser has a good effect on regeneration of nerve tissue. Bella's treatment included laser beginning three days post-surgery and continued for most of her recovery – dosages changing were made to account for acute phase versus end stage recovery. We also know from several human and animal studies over the last 25 years that E-stim can maintain muscle physiological properties even when that muscle is denervated thus promoting a faster return to functional recovery.

In addition to use of E-Stim and laser, PEMF (pulsed magnetic field) and Alpha Stim (microcurrent) modalities were also added to Bella's treatment program. Studies show that PEMF stimulates cellular metabolism, blood circulation in and around damaged tissues and brings more oxygen into cells to facilitate the recovery process. Microcurrent therapy involves the application of currents similar to those generated endogenously during the normal tissue healing process. It appears to stimulate healing generally rather than one element specifically. There is substantial evidence that it can promote healing in a variety of tissues and conditions. It is easy to apply and virtually no contraindications. We apply the current via ear clips with a conducting solution to promote good contact. A side benefit appears to be a general calming of the dog which can facilitate treatment. With specifically selected modalities and a graduated therapeutic exercise program Bella has made a full functional recovery.

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Lick Granuloma

By Laurie Edge-Hughes, BScPT, MAnimSt (Animal Physio.), CAFCI, CCRT

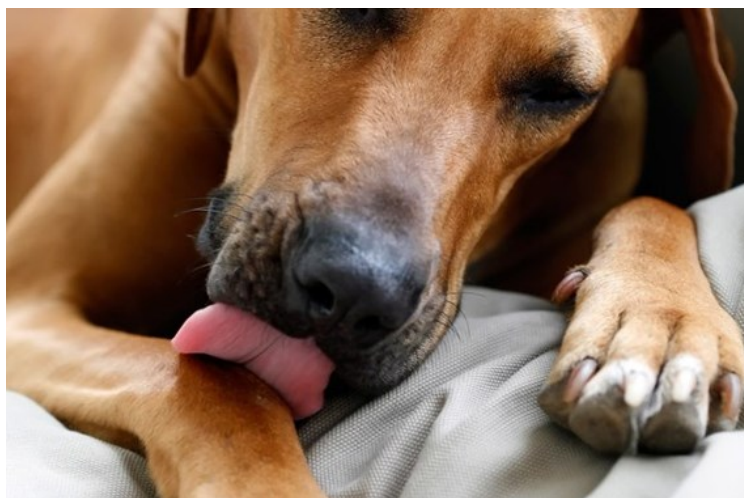
Is the dog licking or chewing at a foot or one particular patch of skin? Does it suck on its back feet? Noticing a discoloration of the hair or an area of hair that is slicked down or a bit crusty from saliva? Maybe the case at hand already has a distinct lick granuloma! Well then, please keep reading! Some worthwhile information ahead!

Firstly, let's talk about nerves. Nerves supply motor and sensory information to and from the spinal cord, brain, and any other part of the body. They typically slide along the tracks that they run, and are accustomed to getting stretched, tweaked, and sometimes pinched. Most of the time, they're pretty resilient. However, if a pinch or stretch goes on for too long or happens over and over and over again, then that nerve can get inflamed. Inflammation to a nerve is where things go awry and is the gist of this blog!

When a nerve is inflamed, it can cause the signaling to go haywire. Messages out from the brain and spinal cord can be 'over-signaled' or inappropriately signaled. One thing that can happen with a pinched / inflamed nerve is that it can produce a pins and needles sensation. Quite likely you've experienced this at some point in your own body! Other time, it can create a numbness, whereby the sensation in an area is compromised. (Now is a good time to test all of your fingertips to see if they are all experiencing the same sensation... once I found that a side of one of my fingers was numb and I didn't even know it.)

What do you think a dog would do if he/she were experiencing a pins and needles sensation in a leg or a foot? It's not crazy to think that their first instinct would be to lick it, chew it, or bite at it. Sometimes they can lick at an area so much that the skin reacts and an aggravated hairless wound is created (a lick granuloma). Typically, veterinary medicine will look at licking and chewing or these lick granulomas as being a result of allergies, a minor irritation, joint or bone pain, an infection, boredom, stress, or anxiety related. Sometimes that's true. However, veterinarians will often state that lick granulomas are very difficult to treat. Part of the reason for that is that they might be treating the wrong thing!

There are a handful of papers out there on the subject of lick granulomas and pinched nerves. My favourite is an article that provided researched data showing that 56% of cases of lick granulomas could be correlated with nerve conduction deficits. What does that mean? It means that in those cases, the nerve that supplied the limb was compromised in some way, thus affecting its ability to transmit information. This is exactly what happens when a nerve is pinched.



Lick Granuloma Continued...

Now, for those of you research nerds out there (like me), here are some of the papers:

- Steiss JE, Bradley DM, MacDonald J et al. 'Letter to the Editor.' *Veterinary Dermatology* 1995, 6(2): 115 - 116.
Lynch AK. Successful treatment of lick granuloma with chiropractic therapy. *Aust Vet Practit.* 2003, 33(4) 176.
Van Nes JJ. Electrophysiological evidence of sensory nerve dysfunction in 10 dogs with acral lick dermatitis. *J Am Anim Hosp Assoc.* 1986, 22: 157-160.

We see this problem commonly at The Canine Fitness Centre Ltd as well! In fact, whenever we see evidence of licking (slicked hair in an area, a hairless patch, a skin wound, or pinkish-rust coloured hair), we always check the spine! Neck issues, and upper thoracic spine and rib problems can cause abnormal sensations in the front legs, and lumbar spine and sacroiliac joint troubles can cause abnormal sensations in the rear legs. If the problem is in all 4 limbs, then it's not likely a pinched nerve! It's more likely to be an allergy in that case. Occasionally, we have even seen issues in the middle of the back, such as a hairless patch, an area of more dander, or just thinner hair. This too can be the result of a pinched nerve (it's just that a dog can't get to that region to lick!)

The great news is that all of the therapists here at The Canine Fitness Centre are highly trained in manual therapy. We use mobilizations to move the spinal joints and open up the joint spaces, thus freeing the pinched nerve. Mobilizations have been shown to be just as effective as spinal manipulation, and are gentler and often better at helping to enhance blood flow to an area (which can help to dissipate inflammation faster). Beyond the manual therapy, you'll find we typically laser the spine and the area of the licking (especially if the dog has created a wound). The laser helps with reducing the inflammation, settling down pain, and healing wounds. Then, if appropriate we will show you how to traction your dog's spine. This can really help to speed up healing and gives you something that you can do to help the situation at home. All in all, it's a comprehensive plan!

So, if you have a dog that is licking or chewing at a limb, think about sending that dog in for a physio evaluation. It could be the missing link to treating a potential nerve impingement problem!



A Tail to Tell Case Study

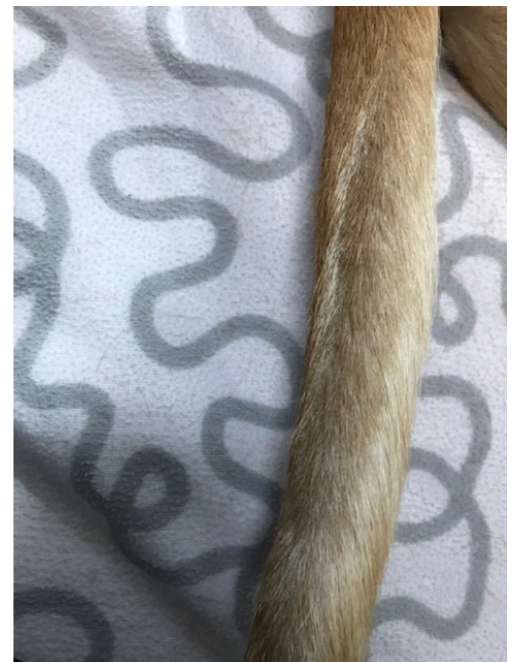
Jennifer Gordon, BScPT, CCRT

I recently treated a lovely, energetic 7-year-old Ibizan Hound. He initially came to The Canine Fitness Centre with complaints of soreness on right hip extension and lower rib issues. Upon assessment I noted he had tenderness in his thoracolumbar and lumbosacral regions (mid and lower back) and a right pelvic dysfunction. He presented with tight myofascial tissue (myofascial tissue underlying the skin that attaches to muscles, joints and organs) and restricted and tender tail mobility. I also noticed there was a bald patch of skin along his proximal tail, more predominant along the right side.

Overall, I noted the dog stood with his hind legs quite straight and tucked under him. The owner reported that he lacked a long stride in his running gait and wasn't as playful with the other hounds in the household.

My physical diagnosis was that this sweet boy was suffering from a few levels of joint dysfunctions along his spine (namely thoracic joints T 11-13 and the lumbosacral area L 5 - S 1), his right pelvis was hypomobile and elevated and in general he had tight myofascial tissue along his mid to lower back. This tight connective tissue in our bodies can restrict the flow of circulation and restrict the mobility of nerve tissue that exits our spine and travels to our extremities.

We agreed upon some treatment that included manual therapy to mobilize spinal, pelvic, and rib joints, soft tissue release to the myofascia and surrounding musculature, gentle tail mobility to increase neurovascular circulation and mobility through the lower body, laser to the lumbosacral joints and nerve roots, and PEMF therapy. We incorporated some home exercises of stretching, skin lifts, gentle tail traction and strengthening activities.



A Tail to Tell Case Study Continued...

Within three sessions over a one month period, the owner reported a whole new energy and playfulness towards people and the other dogs! Furthermore, we started noticing some hair growth return along his tail! After 2 months, his tail growth became completely full with no patches of baldness.

Nerve roots that exit the spinal cord between the vertebrae are responsible for motor function (strength), sensory function (pain, numbness, tingling) and autonomic nervous system functions (hair growth, nail health, organ function). The lumbosacral plexus is a nerve root bundle made up from the fourth through seventh lumbar levels and all the sacral nerves. Issues of compression or degenerative disc disease to any of these levels may cause signs of motor, sensory, or autonomic abnormalities in the pelvic areas, hind limbs or tail region.

The first sign of nerve root dysfunction is a loss of proprioception (body awareness). This may present as a loss of balance, change in gait or a lack of ease of movement in a joint or limb. Later signs may be muscle tension – tight muscles that begin to restrict our range of motion in certain joints. Pain has been shown to be the last sign of nerve root dysfunction. These are the more obvious signs of licking, chewing, limping, whining, or yelping upon certain movements. As nerve roots are responsible for our autonomic nervous system as well – there may changes in hair loss, redness, hot spots, or nail bed changes that develop over time.

There are of course other issues that may cause hair loss, licking or chewing. There may be environmental, flea or food allergies, hormonal conditions (hypothyroidism), or anxiety/behavioural issues. It is important to follow up with your vet

to rule out or manage these possible problems. However, if all those tests are cleared – keep in mind the musculoskeletal factors that can be at play!



*We'd love to help your patients
find the best treatment plan
possible!! Give us a call!*



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