Preventing Re-injury after Soft-tissue Injuries

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Photos by Diane Lewis Photography

Kathy and her Australian Shepherd Risky entered the agility ring with a mixture of anticipation and frustration. Risky had been out of commission for the last three months with an iliopsoas (groin) strain. She had known something was wrong when he suddenly started knocking bars, especially on sharp turns. Her veterinarian had been unable to identify any physical problem, so she spent two months trying to train him to jump more carefully. Her efforts went unrewarded.

Then she took Risky to a veterinarian who had a reputation for understanding the specific physical problems that can affect canine athletes. He had immediately diagnosed iliopsoas strain just one month ago. She dearly wanted to qualify for the AKC Agility Nationals, and she needed two more Double-Qs, but time was short. The veterinarian recommended a comprehensive two-month rehabilitation program, but Kathy decided instead to give Risky a month of rest and non-steroidal anti-inflammatory (NSAID) drugs, hoping he then could return to competition in time to get those last two Double-Qs. Now she crossed her fingers that Risky would perform with his pre-injury speed and agility.

In the Standard class, Risky was fast, with just one bobble over a jump that followed a 180° turn, and his run was clean. But in the Jumpers class two hours later, he knocked two bars in a complex box sequence and completely misjudged the last jump of the course, a triple, crashing into it pretty badly and coming up lame in the rear (the same rear leg that had suffered the iliopsoas strain).

We invest so much time, money, and emotion in our dogs, it is hard to see them injured. But re-injury takes an even greater toll on our emotions and plans, and on the dog's attitude and overall fitness. A recent study in Greyhounds suggested it requires 10% of the dog's working lifespan to establish a pattern of movement such that the dog can achieve maximum speed. It is likely the amount of time required to achieve optimal performance is even greater in agility dogs that have a much more complex physical job. Injuries mean even more lost time, to say nothing of potentially permanent effects on our dogs' health.

What Are Soft-tissue Injuries?

Soft-tissue injuries, those involving muscles, tendons (which join muscle to bone), and ligaments (which join bone to bone), are more susceptible to re-injury than boney injuries. Bone heals by making new bone that is no different in structure than the original bone, but soft-tissue injuries, particularly when severe, often heal by replacing the original tissue with connective or scar tissue.

Let's take tendons and ligaments for example. They consist of collagen fibers that are parallel to one another in an alternating arrangement that makes the fibers crimped at rest. When tension is put on the end of a tendon or ligament, the fibers straighten out, lengthening the structure. When the tension is removed, the tendon or ligament springs back to its crimped position. However, if the tendon or ligament is stretched beyond its straightened conformation (more than 3% longer than its resting position), the collagen fibers begin to break and the broken ends spring back to their crimped position, preventing them from healing together. The gap then fills with connective tissue, consisting of randomly oriented collagen fibers that have no ability to stretch. The result is a minor or major loss in the function of the tendon or ligament, depending on how many fibers have ruptured. Therefore, a major goal of rehabilitation and retraining of the injured athlete is to reduce the amount of scar tissue that develops.

Prevention Starts with Fitness

Prevention of re-injury actually starts before the injury ever happens, with a dog that is appropriately fit for the sport(s) in which he competes. Studies in human athletes have shown that initial fitness is an important predictor of the speed and completeness of recovery after an injury. Following are five essential components of a complete fitness program for canine athletes.

- **Strength training:** Since dogs don't have opposable thumbs, it is really tough for them to perform weightlifting exercises the way their people do. Instead, dogs increase their strength when they move their bodies over short distances, especially when they move against the effects of gravity. Some strength-building exercises for dogs include running up hills, performing a beg-stand-beg without putting the front feet on the ground, bounding through the woods off leash, retrieving a ball or bumper on land or in the water, or playing doggie wrestling games.

- **Proprioception training:** Proprioception is a scientific word for body awareness, and there are special nerves in the spinal cord that control proprioception. These nerves can be tuned up, especially to improve a dog's awareness of where his feet are, a critical skill for agility. One of the best and most deceptively simple body awareness exercises is to have your dog walk through a ladder laid on the ground, the slower, the better. Once your dog can walk forward without touching the edges or the rungs, have him move backward. You also can put the ladder on an uneven surface like an air mattress or place it on a hill. Another variation is to have your dog step sideways first with the front feet, then with the rear feet stepping between the rungs.
- **Endurance training:** This involves aerobic exercise, and the best examples are where the dog trots at least 20 minutes or swims at least 10 minutes without stopping. The trot is the best gait on land because it is the only normal canine gait that requires each front or rear leg to bear weight all by itself, without any assistance from its opposite leg. You can provide your dog with basic endurance exercise by taking him for a 20-minute walk and insisting he trot the entire way. Or you can bike, in-line skate, or scooter to keep up with your dog. To get your dog to swim continuously for 10 minutes, you can walk around the circumference of a pool with your dog as he swims or use a kayak or other water conveyance to keep your dog moving at a relatively constant speed. The good news is that agility is not an endurance sport like herding or mushing, so agility dogs need only a minimal amount of endurance training; three 20-minute trots a week are sufficient.
- **Warm-ups and cool downs:** Humans who are properly warmed up before the 100m dash run 7% faster. Extrapolated to dogs, that's about 4 seconds on the average agility Standard run. Warm-ups should include movements that recapitulate what the dog will do in the event. So for agility, a good warm-up could include some trotting, some jumps, some tugging, and so on. These exercises provide active stretches where the dog moves his body through motions that are similar to those of agility. It is best not to try to passively stretch your dog's limbs by lifting them and stretching them out. This can be uncomfortable and can even increase the risk of injury. Think of someone who doesn't speak your language trying to manipulate your limbs and stretch them appropriately for the kind of movements you will undertake in agility and you can see how unlikely it is to be successful. A good cool down consists of gradually reduced exercise, such as a little trotting followed by walking, then a brief whole-body rubdown and an offer of water.
- **Skill training:** This type of training needs no explanation since it is what you do to train your dog in the sport of agility. It is critical, however, that skill training is not the only kind of fitness exercise your dog receives. Even if you trained agility for two hours every day, your dog would not be optimally fit. So be sure to include all five components of a balanced fitness program.

If Your Dog Is Injured Get a Diagnosis

You cannot undertake an appropriate rehabilitation program for your dog unless you first have a full and complete diagnosis. It is not enough to know the general area of your dog's body that is affected. You need to know the exact tendon, ligament, muscle, or bone that is affected. It can be difficult to get an exact diagnosis at times, but you should always start your search with the veterinary profession, using veterinary specialists whenever necessary. While a physical therapist or massage therapist who works with dogs can provide essential knowledge to assist the rehabilitation process, they do not have the years of veterinary training required to make a definitive diagnosis. Without that, you can only treat your dog symptomatically, not identify and rectify the causative insult. It can be frustrating to go to several veterinarians to get help, but is not dissimilar to the frustrations of finding the cause and appropriate therapy for your own health problems.

When the veterinarian diagnosed Risky's iliopsoas strain, she also did a full examination to ensure that he didn't also have cranial cruciate ligament insufficiency, hip dysplasia, or any of the other spinal and rear limb abnormalities that frequently accompany this condition. As a result, Kathy was confident that after a period of rehabilitation, Risky could undertake a sports retraining program and get back to training and competing in agility.

Rehabilitation of Soft-tissue Injuries

Once your dog's injury has been diagnosed and treated, the next step is to work with the most talented rehabilitation therapist you can find to devise a step-by-step plan that helps to heal and strengthen the specific structures affected by the injury. Try to find a therapist who has at least trained a dog in agility to familiarize themselves with the rigors of the game and some of the most common training techniques.

Your dog is first examined to confirm the primary injury and then assessed for compensatory muscle tension, minor strains, trigger points, and joint tenderness, all associated with the body's attempt to make up for the initial deficit. The primary goal of physical rehabilitation is to heal first and then to strengthen the

affected limb/muscles while making sure to support the rest of the body through the healing and strengthening process. The therapist chooses the appropriate modalities to aid in the healing of the primary injury. Common physical rehabilitation modalities such as therapeutic ultrasound, transcutaneous electrical neuromuscular stimulation (TENS), laser, neuromuscular electrical stimulation (NMES), magnetic field therapy, manual therapy, underwater treadmill, and swimming can all, when used properly, assist in treating orthopedic injuries, neurological conditions, and chronic conditions brought about by normal aging and competition in canine athletes.

- **Therapeutic ultrasound:** Provides thermal and non-thermal mechanical stimulation to promote tissue healing of muscles, tendons, joints, ligaments, and bones. Therapeutic ultrasound can improve mobility, promote soft-tissue wellness, reduce scar tissue, and enhance bone repair. This modality is commonly used to treat shoulder/tendon injuries and to help restore correct range of motion to injured and post-surgical joints.
- **TENS:** Decreases pain by providing a low level electrical current, which disrupts the normal pain perception pathways. TENS is a common modality used in humans to control pain from injury and post-surgical circumstances. It is used in the same way in dogs to help decrease inflammation and pain following common injuries such as cruciate ligament rupture and postoperative elbow disease.
- **Laser:** Light energy used to stimulate healing, provide pain relief, and facilitate the reorganization of injured tissues. Cold laser or light therapy is a very common modality that can be used on a broad spectrum of injuries, including arthritis, joint swelling, muscle trigger points, and post-operative pain and inflammation. It is currently FDA approved to help treat arthritis in humans.
- **NMES:** Uses a low level electrical current that decreases swelling and allows muscle contraction after orthopedic or neurological injury. NMES is a common modality used in patients that are paralyzed or have difficulty using their muscles after surgery. This electrical current helps to contract the muscles to help prevent muscle atrophy and assist in regaining neurological function.
- **Magnetic field therapy:** Uses the power of a pulsed magnetic field to aid in tissue repair, cellular wellness, and relaxation. This modality has all the same benefits as static magnets but is delivered during a 30-minute treatment time. It has also been found to help relax the canine patient during massages and treatments with other modalities.
- **Manual therapy techniques:** These include mobilization of limb joints and spine, soft-tissue mobilization, and myofascial release. These techniques can increase circulation, improve joint range of motion, and enhance soft-tissue mobility. Manual therapy and exercise programs should be an integral part of any rehabilitation program. These techniques help your dog to regain normal joint function, to provide relief for tired and stressed muscles overused in compensation, and to build the needed muscle to return to normal daily life and competition after injury or surgery.
- **Underwater treadmill therapy:** Uses the buoyancy, resistance, and hydrostatic properties of water to promote an increased range of motion of joints in a regulated environment. Swimming also uses these properties of water to strengthen muscles and promote aerobic fitness without impact on joints. These two modalities are useful when used correctly and at the proper time in injury and postoperative situations. It is very important that the rehabilitation therapist properly assesses the dog's healing process and schedules the more vigorous therapies at the appropriate time of healing.

Once the therapist chooses the appropriate treatment modalities for the dog, the sessions usually occur once to twice weekly and appointment times usually range from 30-60 minutes. The length of time the treatments continue depends primarily on the progression of healing in the tissue, with a final step of weaning off the modalities once tissue healing has occurred and increases in exercise are initiated.

When the therapist assesses that the appropriate healing has occurred on the injured tissues, a customized home exercise program can be developed to rebuild muscle to get the dog back to good muscle mass so that the dog can begin sports retraining safely.

Preventing Re-injury through Sports Retraining

A guy who is playing weekend warrior and gets injured in a tag football game gets a diagnosis, then undergoes surgery if necessary, and this is followed by a period of physical therapy to regain the function of the injured structures. But a professional football player takes the additional step of undergoing sports retraining to go from everyday function to the maximal function required by the sport. He needs to learn how to tackle, catch a pass, and run the ball in ways that fulfill the requirements of the sport, yet protect him from re-injury. Agility dogs are like the professional football player. Regaining function isn't enough. The dog has to go to the next level and regain those special abilities that not only make him successful in agility but also help prevent re-injury or future injuries. That's what sports retraining is.

When developing a sports retraining program for a canine athlete, it is critical to start with a full understanding of the physical requirements of each sport in which the dog participates. In a recent survey of 168 agility dogs, 63% also competed in other sports, and some compete in as many as five or six, so broad experience is important. Next, consider the ways in which the dog must use his body to train and eventually compete in each sport. With a full understanding of the dog's injury and the surgery/rehab that has been undertaken to date, start by designing a program that begins with the components of the sports that are least stressful to the dog's body and are best able to protect the dog from re-injury. Then gradually progress to more complex physical requirements of the sports, always keeping in mind how you plan to monitor the dog to assess whether the retraining program needs revision. This can happen with dogs that are so driven in agility that they risk re-injury, because the dog is just progressing more slowly than expected, or because other injuries surface that were masked by the more urgent injury. Depending on the injury, it takes approximately two to three months of retraining (three to four training sessions a week) to go from pet-level fitness to agility competition, although this is highly variable depending on the dog.

Since sharp turns, slipping, and movements involving extension and/or abduction of the rear leg would increase the chances of re-injury, Risky started with 8" jumps, tunnels and tables in straight lines or wide curves with a maximum of six obstacles and only 5- to 10-minute training sessions for the first two weeks of sports retraining. Kathy was advised to ice his groin for 20 minutes after each training session during the entire sports retraining period. In addition, Risky was given exercises to increase the strength of his lower back and rear legs, as well as proprioception exercises to tone up his knowledge of rear foot placement. For the next two weeks, he worked with 12" jumps with up to 90° turns. The chute and teeter were now included in the training sequences and up to 10 obstacles were included in a sequence. Training sessions could now be 15 minutes, including breaks to change obstacle configurations.

Next, he progressed to 16" jumps with occasional wide 180° turns, use of the A-frame and tire, up to 12 obstacles, and 20-minute training sessions for two weeks. In the final two weeks, jump heights were increased to his competition height of 20", but only 25% of the jumps were at that height. The dogwalk and weave poles were added and Risky could train for up to 30 minutes with relatively normal course sequences. Kathy was advised to be sure that the footing where she trained was absolutely slip-proof and provided a soft landing to help prevent future injuries. Risky went on to a complete recovery and qualified for the Nationals the next year.

M. Christine Zink, DVM, PhD, a veterinary sports retrainer and consultant on canine fitness, has authored many books and DVDs on the care and training of the canine athlete. Her latest book, The Agility Advantage, published by Clean Run, was released in January 2008. Dr. Zink runs a Border Collie and a Norwich Terrier in agility. Contact her via www.caninesports.com. Debra Canapp, DVM, CCRT, CVA, practices veterinary rehabilitation at the Veterinary Orthopedic and Sports Medicine Group (VOSM) in Annapolis Junction, Maryland, with her husband Dr. Sherman Canapp. She lectures on current techniques in veterinary rehabilitation to veterinarians, agility groups, police, and search and rescue groups throughout the United States.