

The Technician's Role in Managing Arthritis

Liz Hodson, BS, LVT, CCRP

Physical Rehabilitation

Auburn University College of Veterinary Medicine

Auburn, Alabama

334-707-0515

hodsoem@auburn.edu

The Technician's Role in Managing Arthritis

Abstract:

The purpose of this lecture is to provide a review of the anatomy of the joints commonly affected by osteoarthritis and effects of osteoarthritis on those joints in canine patients. The use of a multimodal approach to managing osteoarthritis and the available modalities and the technician's role will be explored to improve the quality of life of a patient suffering from osteoarthritis.

Key Words: Osteoarthritis, multimodal care, supplements, physical rehabilitation

Osteoarthritis is the most common musculoskeletal disease and the leading cause of chronic pain in dogs. It is estimated to affect one in five dogs. Osteoarthritis is a chronic and progressive disease of the articular cartilage that leads to permanent cartilage deterioration. The chronic inflammation associated with the disease causes the erosion of cartilage and leads to bone remodeling and soft tissue changes. These changes to the joint cause a chemically mediated response leading to low-grade inflammation within the joint.

The causes of osteoarthritis vary widely. Congenital and developmental abnormalities can lead to joint incongruity causing mechanical damage to the joint structures. Trauma, repeated overuse, and joint instability can also lead to osteoarthritis. Infection within the joint can damage cartilage and the synovial membrane which will also lead to osteoarthritis. A common cause of osteoarthritis that can perpetuate itself is obesity. Approximately 40% of dogs in the United States are overweight or obese. The excess weight of an obese animal on its joints causes inflammation and joint damage. Losing as little as 11% of body weight can have a positive impact on the clinical signs of an overweight or obese patient. By simply maintaining a healthy

weight a patient can decrease the pressure on its joints and decrease the pain and discomfort caused by osteoarthritis.

Synovial joints are the most common joint in the body and have the highest occurrence of osteoarthritis. A synovial joint is the only type of joint that is surrounded by a joint capsule. The joint itself is comprised of subchondral bone, synovial fluid, joint capsule, and hyaline (articular) cartilage.

Subchondral bone is a thin layer of bone that connects the hyaline cartilage to the cancellous bone. Its main purpose is to act as a shock absorber and distribute forces on the joints and bone. It is located at the ends of long bones.

The synovial fluid is a lubricating fluid that is produced by the synovial membrane. It not only lubricates the joint, but also acts as a shock absorber and a transportation vessel for nutrients and waste. Synovial fluid moves nutrients throughout the joint while also removing carbon dioxide and waste products from the joint. The synovial fluid is clear and viscous with a degree of elasticity. The use of joint fluid analysis is beneficial when diagnosing joint disease and infection. When the joint has suffered inflammation, the volume of joint fluid present in the joint increases.

The joint capsule is specific to synovial joints and provides protection and stability to the joint and contains the synovial fluid within the joint. The joint capsule is comprised of the synovial lining, which is the inner layer, and fibrous tissue that is the outer layer. The synovial lining is vascular and neural and allows movement of the synovial fluid. The fibrous layer serves as a protective envelope to the joint. The meniscus is a fibrocartilaginous extension of the joint capsule that aids in joint stability and improves bone to bone contact. The meniscus is not covered by synovial lining.

Hyaline or articular cartilage lines the ends of long bones and is avascular. It contains a large amount of collagen allowing it to be flexible and act as a sponge. As pressure or weight is added to the bone, the hyaline cartilage compresses and expels waste. In contrast, when weight is removed from the bone, hyaline cartilage expands and absorbs nutrients into the cartilage. It aids in the distribution of nutrients contained in the synovial fluid and the removal of waste. The hyaline cartilage allows for the distribution of forces and weight while decreasing friction on the articulating surfaces of the joint.

The first signs of osteoarthritis will be changes to the articular cartilage. As osteoarthritis progresses, cartilage and collagen fragments become present in the joint space leading to

increased inflammatory responses. Macrophages and proteoglycans are released into the synovial fluid causing further damage to the joint. The damage increases the chemically mediated inflammatory response and a non-purulent inflammatory reaction occurs. This cascade of events leads to a decrease in the quality and quantity of synovial fluid and a thinning of the cartilage. With the primary shock absorbers of the joint deteriorating, bone on bone contact occurs leading to the death of chondrocytes and the eventual collapse of the matrix. Once the matrix is compromised, bone remodeling occurs around the joint leading to pain, stiffness, and decreased joint function.

The clinical signs of osteoarthritis vary in severity and include cartilage destruction, synovitis, subchondral bone remodeling, and osteophyte formation. The inflammation within the joint is chemically mediated and leads to the hypersensitivity of nociception neurons and an increase of pain sensation in the joint. The physical reaction to joint pain is a decreased willingness to fully utilize the joint causing stiffness and a decreased range of motion in the joint.

Owners of pets with osteoarthritis often notice intermittent lameness, stiffness, or difficulty navigating obstacles and rising. The pain associated with osteoarthritis can cause a patient to limit their own activity leading to weight gain and a more sedentary lifestyle. Behavioral changes such as aggression, lethargy, or irritability may also occur. Signs of pain can vary between patients and range from loss of appetite to muscle tremors and vocalizing.

When a pet owner arrives for an appointment, it is vital to obtain a complete history of the pet's symptoms with timeframes, habits, and any known injuries or illnesses. As a technician it is vital to discover as much about your patient as possible and to communicate with your veterinarian the details of the history. This will allow the veterinarian to have a full picture of what is going on with the patient. There are many questions that will provide important information as to the status of the patient. Some of these questions include: location of food and water, difficulty with certain normal activities, if medications are being given, has there been any change good or bad.

Once the history is complete and it is time for the veterinarian to complete their physical exam, it is pertinent to use proper restraining techniques to protect the pet, the veterinarian, and yourself. Since osteoarthritis is a painful disease, the exam can often be uncomfortable, and it is important to always be mindful of the patient's body language. It is important to tell the owner that a pet with osteoarthritis is often more sore following an exam.

Osteoarthritis can be diagnosed on physical exam through palpation and observation. If further diagnostics are needed, radiographs are typically performed. Osteoarthritis can also be diagnosed using: CT, MRI, and arthroscopy, though these means are not typically needed.

When developing a care plan for a patient suffering from osteoarthritis it is beneficial to use a multimodal approach. The multimodal approach includes lifestyle changes, nutrition and weight management, supplementation, pain management, joint support such as Platelet-Rich Plasma injections, and Stem Cell Therapy, the incorporation of physical rehabilitation, and the use of adjunct modalities such as acupuncture. By using a multimodal approach to caring for patients with osteoarthritis, a whole animal approach is taken. The disease itself is irreversible but by treating the whole animal the quality of life can be improved, and symptoms can be decreased.

Mobility is often affected in patients with osteoarthritis and lifestyle changes are sometimes needed. Lifestyle changes or environmental modifications can aid in the patient's functional ability and sometimes provide more independence for the patient. Flooring surfaces that have less traction such as tile and hardwood can often cause the patient to slip or fall causing them to be less willing to walk on their own. By simply providing walking surfaces with good traction, such as non-skid rugs, the patient is usually more likely to move about on their own. There are also products such as booties and toe grips that can add a layer of support and traction on slick surfaces. Stairs often cause patients with osteoarthritis difficulty, so providing ramps to ease the force placed on the joints can alleviate some pain. Providing bedding that provides firm padding can decrease the pressure on joints when the patient is resting. By elevating the patient's food and water they can eat and drink more comfortably. In some cases, the use of assistive devices such as slings and harnesses is beneficial for mobility.

Weight management and nutrition are also key elements of managing osteoarthritis. By maintaining a healthy weight, less pressure is placed on the joints thereby decreasing joint pain. Obese animals place extra unnecessary pressure on joints and seem to experience more pain associated with osteoarthritis. By simply decreasing the weight placed on the joints, pain caused by inflammation can be lessened and mobility can improve. There are commercially available prescription diets that are specifically formulated with joint care in mind. When using diet to aid in the treatment of osteoarthritis, it is important to use a diet that is rich in Long-chain omega-3 fatty acids such as EPA (eicosapentaenoic acid) or DHA (docosahexaenoic acid). The addition of EPA or DHA to the diet of a patient suffering from osteoarthritis has shown an improvement in clinical outcome. EPA causes a slowing of cartilage degeneration by increasing collagen production and decreasing local cytokine production. It is also important to ensure the

diet provides adequate fat and protein based on the patient's life stage. Senior patients require about twice as much protein in their diets as their younger counterparts.

The addition of joint supplements can also be beneficial to a patient suffering from osteoarthritis. There are many joint supplements available either over the counter or by prescription. One such supplement is fish oil. As previously stated, an EPA-rich diet can aid in the slowing of cartilage degeneration. Fish oil (EPA or DHA) is a long-chain omega-3 fatty acid that is found in cold water fish. The fish oil can be added to the patient's food if the diet is lacking sufficient EPA. Other available joint supplements include New Zealand Green Lipped Mussels, glucosamine and chondroitin, Phycox, Dasuquin, and Cosequin. All these supplements contain glucosamine and chondroitin which is beneficial to slow cartilage degeneration, in addition to other ingredients aimed at improving joint health.

In addition to supplements and nutraceuticals, there are also medications and modalities available to aid in joint support. Adequan and Librela are two injectable medications that aid in decreasing inflammation within the joint, though they work in different ways. Adequan, a Polysulfated Glucosaminoglycan (PSGAG), is often added to a treatment regimen due to the low risk of side effects. This medication works by blocking the release of enzymes that cause inflammation in the joint and stimulating the existing cartilage to improve the quality of synovial fluid. Librela is an anti-NGF (nerve growth factor) monoclonal antibody therapy that limits the production of proinflammatory mediators. Other forms of joint support or regenerative medicine include platelet-rich plasma therapy, stem cell therapy, and Synovetin OA injections. While regenerative medicine is available and can be a viable option for many, there is typically a substantial cost that is associated with the procedures.

Pain control is essential in the management of osteoarthritis. Medications such as opioids and non-steroidal anti-inflammatories (NSAIDs) are beneficial and can be used in conjunction with pain modifying analgesic drugs (PMADs). By using medications that target specific pain receptors, more complete pain management can be achieved. Because osteoarthritis is a chronic condition and will likely need long term medications, using a low dose of medications can help minimize adverse side effects. Acupuncture can also be used as an adjuvant to assist in pain control.

Incorporating physical rehabilitation into an osteoarthritis care plan is beneficial. The issues physical rehabilitation addresses in osteoarthritis cases are typically a decrease in range of motion, functional ability, muscle mass, and an increase in weakness. These deficiencies can

be improved with physical rehabilitation. The overall goal of physical rehabilitation is to improve the overall quality of life and the functional ability of the patient. In order to improve a patient's functional ability, balance and proprioception need to be improved. The use of daily low-impact exercise like walking can increase strength and aid in weight management. Physical rehabilitation sessions should be completed three to five times a week to encourage mobility. Sessions are usually short and gradually increase as the patient is able.

There are many modalities available in physical rehabilitation to aid in improving a patient's functional ability. Using therapeutic exercises improves strength, balance, proprioception, and functional ability. The use of thermal therapy can aid in pain control and minimizing inflammation. Manual therapies such as passive range of motion and massage allow for the patient to improve functional range of motion and decreases pain. Water therapy, such as underwater treadmill or swimming, provides an aerobic exercise for the patient and allows decreased weight bearing or non-weight bearing exercise. By decreasing the pressure on the joints of the patient, they are able to exercise with less pain. Therapeutic ultrasound provides analgesic effects and increases blood flow to the tissues being treated. Therapeutic laser is thought to inhibit inflammation while providing a release of endorphins and reducing pain. Electrical stimulation can be beneficial in osteoarthritis patients. There are two types of electrical stimulation, transcutaneous electrical stimulation (TENS) and neuromuscular stimulation (NMES). TENS does not elicit a muscle contraction and is used for pain control. NMES does elicit a muscle contraction and aids in muscle strengthening. Extracorporeal shockwave therapy is used in cases of osteoarthritis to provide analgesic effects.

Osteoarthritis is a prevalent condition, and it is important to provide care to alleviate the painful symptoms. Because osteoarthritis is progressive, a lifelong plan should be developed keeping the patient's needs in mind. By using a multimodal approach to care, the patient can maintain a high quality of life for prolonged periods of time. It is important for the technician to act as an advocate for the patient as well as assisting with client education to ensure a team approach to treating patients with osteoarthritis.

Following the presentation, there will be time for questions.

References-

Barbara Bockstahler, David Levine, Darryl Millis: Essential Facts of Physiotherapy in Dogs and Cats Rehabilitation and Pain Management. Babenhausen Germany, VE VetVerlag, 2004.

Darryl L Millis, David Levine: Canine Rehabilitation and Physical Therapy, ed. 2. Philadelphia, Elsevier, 2014.

M. Christine Zink, Janet B. Van Dyke: Canine Sports Medicine and Rehabilitation, ed. 1. Oxford, John Wiley & Sons, Inc., 2013.

Steven M Fox: Multimodal Management of Canine Osteoarthritis, ed. 2. Boca Raton, CRC Press, 2017.

Impellizzer J, Tetrick M, Muir P. Effect of weight reduction on clinical signs of lameness in dogs with osteoarthritis. *J Am Vet Med Assoc* 2000; 216:1089-1091.

Mlacnik E, Bockstahler B, Müller M, et al. Effects of caloric restriction and a moderate or intense physiotherapy program for treatment of lameness in over weight dogs with osteoarthritis. *J Am Vet Med Assoc* 2006; 229: 1756-1760.

Waterhouse J. Osteoarthritis Part 1: Causes, symptoms, and diagnosis. *Veterinary Teaching Academy*, webinar. January 2019.

Waterhouse J. Osteoarthritis Part 2: Detailed walk through of the physical exam. *Veterinary Teaching Academy*, February 2019.

Fritsch, D., Allen, T.A., Dodd, C.E., Jewell, D.E., Sixby, K.A., Leventhal, P.S., & Hahn, K.A. 2010. Dose-titration effects of fish oil in osteoarthritic dogs. *J Vet Intern Med*, 24, 1020-1026.

Roush, J.K., Cross, A.R., Renberg, W.C., Dodd, C.E., Sixby, K.A., Fritsch, D.A., Allen, T.A., Jewell, D.E., Richardson, D.C., Leventhal, P.S., & Hahn, K.A. 2010. Evaluation of the effects of dietary supplementation with fish oil omega-3 fatty acids on weight bearing in dogs with osteoarthritis. *J Am Vet Med Assoc*, 236, 67-73.

Pollard, B., Guilford, W.G., Ankenbauer-Perkins, K.L., & Hedderley, D. 2006. Clinical efficacy and tolerance of an extract of green-lipped mussel (*Perna canaliculus*) in dogs presumptively diagnosed with degenerative joint disease. *N Z Vet J*, 54, 114-118.

Towheed, T.E., Maxwell, L., Anastassiades, T.P., Shea, B., Houpt, J., Robinson, V., Hochberg, M.C., & Wells, G. 2005. Glucosamine therapy for treating osteoarthritis. *Cochrane Database Syst Rev*, CD002946.

Sawitzke, A.D., Shi, H., Finco, M.F., Dunlop, D.D., Harris, C.L., Singer, N.G., Bradley, J.D., Silver, D., Jackson, C.G., Lane, N.E., Oddis, C.V., Wolfe, F., Lisse, J., Furst, D.E., Bingham, C.O., Reda, D.J., Moskowitz, R.W., Williams, H.J., & Clegg, D.O. 2010. Clinical efficacy and safety of glucosamine, chondroitin sulphate, their combination, celecoxib or placebo taken to treat osteoarthritis of the knee: 2-year results from GAIT. *Ann Rheum Dis*, 69, 1459-1464.

Hochberg, M.C. & Clegg, D.O. 2008. Potential effects of chondroitin sulfate on joint swelling: a GAIT report. *Osteoarthr Cartil*, 16 (Suppl. 3), S22-S24.

Zoetispetcare.com

Synovetin.com/files

Vhc.missouri.edu/platelet-rich-plasma-prp-in-canine-orthopedics/

Vet.cornell.edu/departments-centerd-and-institutes/riney-canine-health-center/canine-health-information/osteoarthritis

Librelavetteam.com

www.petmed.com/pet-medication

drugs.com/gabapentin

www.vetspecialist.co.uk/fact-sheets-post/our-guide-to-amantadine

my.elanco.com/deramaxx

www.petmed.com/pet-medication/galliprant-for-dogs

www.zoetisus.com/petcare

www.goodrx.com/pet-health/dog/meloxicam-for-dogs

www.dasuquin.com

www.cosaquin.com

www.phycox.com