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The role of osteopathic manual therapy in treating canine osteoarthritis

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Introduction

Osteoarthritis (OA) is a degenerative joint disease that affects dogs of all ages, breeds, and sizes. It is a condition that causes joint pain, stiffness, and swelling. Osteoarthritis in dogs can significantly reduce their quality of life, limit mobility, and increase the risk of developing other health problems. Traditional treatments for osteoarthritis in dogs include medications, physical therapy, and surgery. However, there is increasing interest in using osteopathy as a complementary or alternative treatment for canine arthritis. A quarter of households own a dog in the UK, sharing our home, some providing emotional, physical and health benefits to their owners. Dog owners are open to therapies that can extend the quality of life of their pets at pre and post arthritic conditions. A number of studies provide physiological declines such as less mobility, sensory and health problems as the dog increases in age. The goals of the owner need to be established and realistic, followed by a comprehensive clinical note taking and manual assessment to provide the best outcome. This thesis will explore the growing use of osteopathic manual therapy as a treatment for canine arthritis and evaluate its effectiveness.

Overview of Canine Osteoarthritis

Hip dysplasia and associated osteoarthritis are among the most common orthopaedic disorders in dogs. Although the precise hip dysplasia aetiology can be considered unknown, it can be a genetically inherited condition from an improperly formed hip joint which usually occurs in larger breed dogs and those dogs that gain excessive weight between 3-8 months of age which in turn, puts excessive load through the immature hip joint. Hip dysplasia itself can be classified as a form of arthritis as this provokes inflammation leading to coxo-femoral arthritis. Osteoarthritis (OA) is a commonly occurring chronic illness in human and animals

alike. This can cause a biomechanical, biochemical and behavioural change in the dog. Canine arthritis is a common condition that affects dogs regardless of age, although it is more prevalent in older dogs. The most common form of arthritis in dogs is osteoarthritis, which is caused by the breakdown of joint cartilage. This causes inflammation, pain, and stiffness in the affected joints. It is a disease of the whole joint. Bone and cartilage receive and dissipate stress associated with the loading of the joint. Research suggests the view that cartilage and bone can communicate over the calcified tissue barrier; vessels reach out from bone into the cartilage zone, patches of uncalcified cartilage are in contact with bone, and microcracks and fissures further facilitate transfer of molecule. (Rik J. Lories & Frank P. Luyten, 2010). Primary osteoarthritis is described as mainly idiopathic. Secondary osteoarthritis, where underlying disease processes or injuries play a role in the development of osteoarthritis, is believed to be the most common form in dogs.(Pettitt et al., 2016) Osteoarthritis can be a contributor the condition hypertrophic osteopathy, which is prevalent in dogs. This has been associated with various conditions such as prostatic carcinoma and prostatitis(Roux et al., 2022). First, pathological changes occur in the articular tissues, commonly manifested by thickened joint capsules. The synovial membrane then becomes inflamed, and the synovial fluid becomes less viscous. Pain will begin at this stage as a result of synovial inflammation, and it is during these early stages that intervention offers the most benefit. The next phase is cartilage deterioration. Finally, osteophytes develop and bone remodelling occurs. This mechanical failure of articular cartilage is the defining element of OA and is irreversible (Shaw et al., 2020) For a dog walking up an incline or down a decline requires special abilities, such as shifting of the body’s centre of mass, accurate control of all joints to enable a stable gait pattern, prevention of falling or slipping, and increasing muscle work. Osteoarthritis of the hip joints leads to complex changes in gait patterns that can cause impairment in gait, which also involves more joints, this causes for example, a decreased

extension in the stifle joint, followed by a more flexed position when the paw is making contact with the ground for stability (Barbara A. Bockstahler, A. Vobornik, Marion Müller, 2009). Extension of the hip joint typically causes pain for animals with osteoarthritis of the hip joints. Dogs with osteoarthritis of the hip joints typically had a reduction in their range of motion of the hip when walking down a decline. It is possible that this was caused by the higher forces exerted on the limb during walking down a slope.(Bockstahler et al., 2012).

Other forms of canine arthritis include rheumatoid arthritis, septic arthritis, and immune-mediated arthritis. Research suggests there are a number of risk factors to take into account ; Body weight was a main contributor, the higher the bodyweight of the dog, the higher the increased load on the joints, for both larger breeds of dog and those that are overweight. (P. Adams, R. Bolus, S. Middleton, A. P. Moores, 2011), data suggests that abnormally increased body weight has an impact on glycosaminoglycan concentration in synovial fluid which may imply that there is faster degradation and turnover of joint cartilage (Radka Andrysíková, Hana Kudláčková, Miroslav Toman, 2012). Around 60% of dogs in the UK are deemed overweight or obese , this attributes to a 20% increase since 2017. (Wallis et al., 2018) Breed was also a common factor as certain breeds are more likely to have particular predispositions to joint diseases as a result of genetic/heritability features, although popularity of a breed may have to be taken into account for this research. Coopman et al, (2008). Injury to the affected joint, for example, cranial cruciate ligament rupture, articular fracture or osteochondrosis, which initiates a biochemical cascade, can also lead to a common pathway of arthritis (Pettitt et al., 2016). Poor weight and limb distribution, primarily to the hind limb can affect forelimbs which could lead to an overload of non-extremities and the vertebral spine.(Barbara A. Bockstahler, A. Vobornik, Marion Müller, 2009) OA in dogs can be diagnosed through physical examination, x-rays, and blood tests. Treatment options for canine arthritis include

medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and disease-modifying osteoarthritis drugs (DMOADs).

Early signs of canine osteoarthritis can be subtle, and change may be very gradual or sporadic. Symptoms of canine arthritis include joint stiffness, limping, difficulty rising, decreased mobility, behavioural changes and reluctance to play or exercise. There are typically five stages of osteoarthritis in canines using the canine osteoarthritis tool (COAST).

Stage 0: Shows no risk factors.

Stage 1: At-risk dogs; clinical signs are difficult to detect, but physical factors of OA are present.

Stage 2: Mild OA; clinical signs are intermittent and include noticeable impairment of the ability to perform certain daily activities, consistent changes in body carriage, and muscle loss or wastage.

Stage 3: Moderate OA; patient has constant impairment of form and a diminished capacity to engage in activities of daily activities/living

Stage 4: Severe disease; mobility is severely impaired, and the patient's ability to move or jump is decreased compared with previous normal activity

However, unlike humans, a range of other barriers may exist. Owners may not be educated to recognise that osteoarthritis affects dogs and in turn, might struggle to notice behavioural indicators. Other factors to consider, can be that the owners may be aware of a problem but are reluctant or delay their dog's presentation due to uncertainty of the veterinarian's recommendations. Pain behaviours can quite often be confused with a behaviour problem. An animal in pain will be more naturally cautious and possibly show signs of anxiety or

displacement behaviour as a result. (Mills et al., 2020). Neutered dogs have a higher risk factor, although again this could be determined by the fact that neutered dogs tend to outlive those that have not had the surgical procedure. (P D McGreevy 1, P C Thomson, C Pride, A Fawcett, T Grassi, 2005). Conformation can create risks of joint disease relating to body versus leg size which creates some breeds more predisposed while other more protected. Asher et al, (2011). Early life factors can also cause further risk. The link between birth month and disease development is likely linked to exposure to differing exercise regimes when a dog is young. Those born in months that offer better weather for exercise opportunities had increased risk of joint disease development. This is further supported through findings that identify exercise levels and types, such as regularly playing with other dogs, chasing balls, and playing with toys, throughout life but particularly when young, are risk factors for joint disease development, due to over-use of and damage to developing joints (Anderson,2020). Some studies have demonstrated that a short period of exercise (around 1.2 km of trotting) increased the degree of lameness when measured on a force platform(Maxim Moreau, Bertrand Lussier, Laurent Ballaz, 2014).

Osteoarthritis is very common in dogs. In a study of german shepherds, 30% of the dogs had OA. Out of 100 mature dogs surveyed at post mortem in another study, OA was present in the hip (52%), shoulder (37%), stifle (36%), and elbow joints (5%). OA in dogs is most often secondary to hip dysplasia, cruciate ligament injuries, elbow dysplasia, patellar luxation and osteochondritis dissecans (Marcellin-little, 2005). Other breeds that tend to be specifically at risk are rottweilers, golden retrievers and labradors. This seems to be linked to a higher risk of cruciate ligament rupture within these breeds.

Along with osteoarthritis, when looking at this as a secondary to hip dysplasia, this is a form of osteoarthritis present in the ball and socket joints. Hip dysplasia can be a genetically inherited condition from improperly formed hip joints typically seen in large breed dogs.

Having laxity in the hip joint can cause stretching of the joint capsules, supporting ligaments and surrounding muscles, leading to permanent damage to the anatomy of the hip joint.(Bland, 2015) Some studies suggest that in over-weight dogs with hind limb lameness secondary to hip osteoarthritis, weight reduction alone may result in a substantial improvement in clinical signs(Impellizeri et al., 2000).

Joint incongruity is more commonly recognised for elbow dysplasia although osteochondrosis can also be a factor. The complex aetiopathogenesis can make identifying this at its early stage difficult.

Patella luxation usually affects small breeds, with most luxation's tending to be medial. Luxation usually is congenital or a development disorder. It also can be secondary to trauma.

Osteopathy as a Treatment for Canine Arthritis

The management of osteoarthritis may involve a combination of medical, surgical and manual therapy approaches along with potentially weight management, if the dog is deemed overweight and a balance of the right amount of exercise. Osteopathy is a complementary therapy that focuses on the musculoskeletal system and its role in overall health and wellbeing. Osteopathy primarily has been a treatment mode used on humans and has gained popularity as a complementary therapy for animals in recent years. Manual therapy has been a cornerstone of treatment in physical therapy and canine physical rehabilitation. Its effectiveness has been validated along with the modes and mechanisms of action expanded upon in the last decade(Mark A. Jones, 2004)

Both human and animal manual therapy are often associated exclusively with the treatment of neurological and orthopaedic conditions. In fact, properly implemented treatment can help with a number of ailments for those who are unable to move independently or move in a pathological manner. This may result from previous traumas in an animal, a period of convalescence potential down to a surgical procedure or a chronic neurological disease/ secondary disease on the system with a good example being obesity. Using the principles of osteopathy, the philosophy is based on the body, the body's ability to heal and regulate itself, the somatic component of the disease, the interrelationship of function and structure, the use of manual treatment in the total care of the recipient. The goal of treatment within animals with osteoarthritis are treated with various approaches, involving invasive and non-invasive measures.

The objectives in managing osteoarthritis include minimising the affected joint pain by reducing the inflammation, slowing the progression of the cartilage damage, resulting in increased joint flexibility and ultimately improving quality of life.(Bland, 2015) it is also important to understand the instability aspects of an affected joint or disruption to the cartilage and maintaining that contralateral leg for example which could get overloaded or other extremities including the vertebral spine. A standardised osteopathic assessment will include observation, passive evaluation, resisted tests (which may include a pain response) and gait analysis are critical to detect any postural shifts. This may also include functional stability for example, how a dog can ascend/descend stairs or a slope. A low head carriage, and sometimes short 'stutter' steps could be an indicator of intervertebral disc disease or further arthritic issues. End range on passive range of motion is valuable as this could indicate an osteophyte formation and/or arthritis. Palpation in both in human and animal can help determine muscle asymmetry and tension. Pain on palpation contributes to the reliability of hypothesis or diagnosis along with other positive clinical assessment findings.

With the progress in animal manual therapy, increasing numbers of the techniques used in human therapy are adapted to be suitable for animal treatment. Many of these techniques have been modified for specific canine use.(Dybczyńska et al., 2022) The main goal in OA management in dogs is to control clinical findings by protecting the joints from osteoarthritis, reducing pain, increasing mobility, and, therefore, the quality of life.

Canine osteopathy can be an effective way to treat arthritis in dogs. The use of osteopathy as a treatment for human and canine arthritis is based on the belief that joint mobility and function are critical for maintaining joint health. The types of treatment used for canine will include Osteopathic Articular Balancing (OAB), this involves fixing a specific joint whilst mobilising another to check for quality of movement along with other secondary mobilisation and distraction techniques. By using these manual techniques to improve joint mobility and reduce stiffness, osteopaths aim to reduce pain, improve joint function, and slow the progression of arthritis in dogs. End feel of a joint for example can be a good indicator with a 'bone to bone' end feel would be characterized as abnormal for that specific joint flexion and could be the result of osteophyte formation and/or osteoarthritis(Edge-Hughes et al., 2023)

Additional management and advice can include regular lead walking, hydrotherapy (such as the use of underwater treadmills and swimming) along with methods of increasing play activity, including the use of puzzle feeders to slow feeding down. (Pettitt et al., 2016)

Research on the effectiveness of osteopathic manual therapy for canine arthritis

Research on the effectiveness of osteopathy for canine arthritis is limited, and most studies have focused on the use of osteopathy as a complementary therapy rather than a standalone treatment.

Among all pet animal and domestic species, dogs suffer from OA more often because of excessive running or exercise, injury, and/or genetic predisposition, with 1 in 4 dogs at present in the United States being diagnosed with osteoarthritis.(Bland, 2015). Manual techniques are used in an assessment to identify soft tissue abnormalities, muscle length tightness, limitations in passive range of motion (PROM), and restrictions in arthrokinematic motion.

A number studies reported positive or beneficial effects of musculoskeletal mobilisation, distraction and manipulation as applied techniques, specifically with chronic symptoms, reducing pain, stiffness and muscle hypertonicity (Haussler et al., 2021). Mobilisation of joints can be extremely helpful in managing canine osteoarthritis. It contributes to increased production of synovial fluid , reduction in inflammation and alleviates pain. (Kerrigan L 2017), a combination of techniques can possibly reduce both tension and inflammation within the joints. Articulation and distraction can help chondrocyte metabolism which can be beneficial to joint cartilage (A. A. van Valburg, P. M. van Roermund*, A. C. A. Marijnissen, M. J. G. Wenting et al., 2000) with research suggesting that articulation in the osteoarthritic knee joints results in a decrease of secondary inflammation of the synovial tissue and created better joint and functional ability in the respective test participants.

Furthermore, osteopathic manipulative treatment has shown promising results in reducing TNF-α levels in dogs, indicating its potential in managing chronic inflammatory diseases (Ross Gillan, Gabrielle Bachtel, Kassidy Webber, Yasmine Ezzair, Nicole E. Myers, 2024) Additionally, lymphatic pump treatment has been shown to increase lymph flow in conscious dogs, suggesting its potential therapeutic value in conditions involving lymphatic circulation(Prajapati et al., 2010) as an example, canine carpal motion after immobilisation and remobilisation also produced significant increases in passive range of motion amplitudes and peak carpal flexion-extension angles measured during while walking (i.e., active joint range of motion); however, the changes could not be definitively attributed effectively to the treatment (Olson, 1987).

Owners of labrador retrievers with OA and restricted joint motion were given instructions for a home stretching program. Owners performed 10 passive stretches with a hold of 10 seconds which was repeated twice daily. After 21 days, goniometric measurements showed that the passive stretching had significantly increased the range of motion of the joints by 7% to 23% (T. Crook, 2007). A lower calorie diet combined with manual and physical therapy improved mobility and facilitated weight loss in overweight dogs. Dietary management and physical rehabilitation may improve the health status more efficiently than dietary management alone. (Mlacnik et al., 2006). The osteopath and owners establish realistic expectations individualised to the patient. These expectations are adjusted over time based on the response to therapy. Client awareness and education of osteoarthritis including a pathogenesis of the disease along with its anticipated progression and fluctuations of clinical signs, will provide a good understanding of benefits of treatment modalities and potential complications of all management options available.

As with many forms of manual therapy, the quality of the outcome depends directly on the compliance of both the animal and its owner. If passive stretching for example, is to be used

as a method for increasing the range of motion of the joints of the prospective dog, the owners must be willing to perform the stretches consistently and regularly, between treatments.

Conclusion

The scientific evidence regarding the efficacy of canine rehabilitation and manual therapy and in this case, osteopathy, is still relatively small, but that body of literature is growing. Currently there is low to moderate quality evidence on osteopathy and manual therapy as a whole. There tends to be a lack of diversity in terms of duration of treatment along with interventions and owner participation on post treatment recommendations. Over the past 30 years, there has been a sample size of anecdotal information regarding rehabilitation in animals, and in particular, dogs. Most of the early literature pertaining to canine rehabilitation was based on the dog as a model for physical therapy in humans. Various studies found that osteopathy, when used in conjunction with conventional veterinary care, can result in significant improvements in mobility, pain, and quality of life in dogs with osteoarthritis. One of the potential benefits of osteopathy for canine arthritis is that it is a non-invasive therapy that does not require medication or surgery. Osteopathy may also be beneficial for dogs that have not responded to conventional treatment or are unable to tolerate medication due to side effects. Understanding the key risk factors of osteoarthritis in canines and the predisposed conditions is the initial step to helping to reduce the onset through preventative methods.

However, it is essential to note that these studies are relatively small and have some limitations. A majority of the research is broad on the volume of lameness in dogs and some of the data is subjective. More research is needed to evaluate the effectiveness of osteopathy as a treatment for canine arthritis. In conclusion, osteopathy in dogs encompasses a spectrum

of conditions affecting the skeletal system, with each condition presenting unique clinical and pathological features. Understanding the distinct characteristics of these conditions is crucial for accurate diagnosis and effective management. Further understanding of osteoarthritis in both humans and animals is key to better, more accurate, earlier diagnosis where osteopathy and other forms of manual therapy can combine with current surgical and animal medical procedures as a multi modal approach to create a better outcome for both the dog and their owner.

Other factors that have to be taking into account which can cause conflicting and inconclusive findings are related to age and neutering along with values in referral rather than general dog population. Owner compliance in post treatment advice is a factor along with constant changes in breed popularity and types of breeding can also have a bearing in evidence.

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