

# Diploma thesis

International Diploma in Canine Osteopathy (int'l DipCO)

Number of words: 3778

Autumn 2025

*«The effect of Osteopathic manual therapy (OMT) in rehabilitation following Cranial Cruate  
Ligament injuries in dogs»*

Mia Kitter

London College Animal Osteopathy

## Table of contents

<b>1.0 INTRODUCTION</b> .....	<b>2</b>
<b>2.0 CCL INJURIES AND REHABILITATION</b> .....	<b>3</b>
2.1 WHAT IS A CCL INJURY? .....	3
2.2 PHYSIOLOGICAL AND BIOMECHANICAL CHANGES AFTER INJURY AND SURGERY .....	4
2.3 WHY IS REHABILITATION NECESSARY?.....	5
2.4 COMMON TREATMENT METHODS .....	6
<b>3.0 OSTEOPATHIC MANUAL THERAPY IN REHABILITATION</b> .....	<b>7</b>
3.1 WHAT IS OSTEOPATHY, AND HOW IS IT APPLIED TO DOGS? .....	7
3.2 HOW CAN OMT SUPPORT HEALING, REDUCE COMPENSATION, AND INCREASE MOBILITY? .....	8
3.3 LIMITATIONS AND NEED FOR FURTHER RESEARCH.....	9
<b>4.0 CLINICAL CHALLENGES IN MEASURING EFFECT AND MOBILITY</b> .....	<b>10</b>
4.1 HOW TO ASSESS IMPROVEMENT IN MOBILITY IN DOGS .....	10
4.2 LIMITATIONS IN DIAGNOSTICS (SUBJECTIVE ASSESSMENT, COMPENSATION, MEASURING EQUIPMENT) .....	11
4.3 HOW WELL IS THE EFFECT OF MANUAL THERAPY DOCUMENTED?.....	12
4.3.1 <i>Systematic review of postoperative rehabilitation interventions after cranial cruciate ligament surgery in dogs (Alvarez et al., 2022)</i> .....	13
4.3.2 <i>Effects on early intensive postoperative physiotherapy on limb function after tibial plateau leveling osteotomy in dogs with deficiency of the cranial cruciate ligament (Monk et al., 2006)</i> .....	13
4.3.3 <i>Osteopathic manipulative treatment improves function and relieves pain in knee osteoarthritis: A single-blind, randomized-controlled trial (Altinbilek et al., 2018)</i> .....	14
<b>5.0 CONCLUSION</b> .....	<b>15</b>
5.1 BRIEF SUMMARY OF WHAT YOU HAVE LEARNED OR GAINED INCREASED INTO .....	15
5.2 REFLECTION: HOW THIS AFFECTS YOUR UNDERSTANDING AND FUTURE PRACTICE .....	16
5.3 POSSIBLE NEED FOR MORE KNOWLEDGE OR EXPERIENCE IN THE TOPICS .....	16
<b>6.0 SOURCES</b> .....	<b>18</b>

## 1.0 Introduction

The cranial cruciate ligament is one of the most common conditions that occurs amongst dogs, and it is estimated that as many as 1–3% of all breeds are diagnosed with this. (Witsberger et al., 2008). This is the most commonly diagnosed cause of lameness in the hind limb of dogs (Elkins et al., 1991; Johnson et al., 1994). It is estimated that this diagnosis is often the cause of meniscus injuries and osteoarthritis (Elkins et al., 1991; Johnson et al., 1994; Witsberger et al., 2008). It is often the senior dogs that experience this in the form of wear and tear, but it may also occur in the younger ones. When occurring in younger individuals, it is mainly as a consequence of a trauma (Bennett et al., 1988; Duval et al., 1999; Elkins et al., 1991; Johnson et al., 1994; Witsberger et al., 2008). The CCL diagnosis is based on a combination of clinical tests and diagnostic imaging (Moore et al., 2005; Witsberger et al., 2008).

The most common form of treatment for cranial cruciate ligament injuries is surgery. This is recommended for smaller dogs under 15 kg, as these dogs have a greater likelihood for developing osteoarthritis. For dogs over 15 kg, it is recommended to perform stabilizing surgery, as these have greater weight-bearing (Weir et al., 2023).

In certain instances, rehabilitation is utilised as an adjunct to surgical intervention, with the most prevalent approaches consisting of physiotherapist-directed rehabilitation programmes or, in selected cases, laser therapy. Furthermore, several studies have incorporated manual therapeutic techniques as an integral component of the rehabilitation process.

Recently, several articles have indicated that osteopathy can contribute to improvement in the rehabilitation process (Duerr et al., 2014). On this basis, I want to investigate whether osteopathic treatment can contribute to increased joint mobility in the dog after a CCL operation.

**Thesis statement:** This thesis is divided into 3 main topics to be discussed: Rehabilitation after CCL surgery, osteopathic treatment in the postoperative phase, and diagnostic challenges in musculoskeletal disorders in dogs.

## 2.0 CCL Injuries and Rehabilitation

### 2.1 What is a CCL injury?

The cranial cruciate ligament is the most common injury where lameness is the main symptom. The average age for dogs receiving that diagnosis is 7 years, but it can happen at all ages and in all breeds (Canine Arthritis Management, 2025). The primary function of this ligament is to stabilize the stifle joint by connecting the femur to the tibia (Canine Arthritis Management, 2025; Colorado State University Veterinary Teaching Hospital, n.d). It can be compared to the ACL ligament in humans which is often injured in trauma, but unlike humans, it is rare that this is caused after an injury in dogs. This joint can be partially or completely ruptured depending on which grade the injury is placed at. This is often a degenerative injury over time or correlation with conformational, genetic, and/or immune-mediated processes within the joint (Canine Arthritis Management, 2025).

Canine Arthritis Management (n.d) has described canine arthritis and divides it into 3 grades:

**Grade 1:** Stretching of the ligament without tearing: The ligament does not function normally and may be painful.

**Grade 2:** Partial tearing or rupture of the ligament: This leads to mild instability of the joint.

**Grade 3:** Complete rupture of the ligament with more significant instability of the joint. (p. 2)

## 2.2 Physiological and Biomechanical changes after injury and surgery

In a CCL operation, various surrounding structures will be involved. The primary structures affected are the knee joint, where swelling and fluid formation will develop. The periarticular and intra-articular structures in the femoral–tibio–patellar joint provide stability (Spinella et al., 2021). If these structures are weakened, surgery will be performed either in the form of TPLO, TTA, or extracapsular techniques. This will significantly increase the stability of the joint after an operation compared to how it was during the injury. After surgery, the joint will become too stable and stiff due to the stabilizing intervention.

After such an operation, the dog will have pain because a surgical procedure has been carried out. Medication to reduce pain is needed and it may have limited weight-bearing because the joint is more likely to be damaged if weight-bearing increases. Secondary muscles will become hypertonic to protect the injured joint. These are surrounding structures but also increased sensitization around the nerves.

Dogs and humans have similar pain perception, meaning that nerve impulses are sent from the injured/operated tissue to the brain to be processed here, resulting in a sensitization process.

Dogs, however, react differently to pain, so it is important that owners are instructed well of potential ways of expression, such as increased vocalization, changed posture, or decreased interest, since verbal communication is challenging as they do not communicate like us humans.

### 2.3 Why is rehabilitation necessary?

Several studies have shown that muscle atrophy occurs quickly after these types of surgery (Monk et al., 2006; Priddy et al., 2003; Vasseur et al., 1992). In one study, it was shown that quadriceps muscle mass decreases up to 5 weeks after the operation and only increases again at 10 weeks after the operation (Millis et al., 1999; Monk et al., 2006). This shows that manual treatment should be carried out soon after surgery to ensure the shortest possible rehabilitation period.

In this study, the group that received manual treatment and home exercises had significant improvements in mobility compared to the group that only used home exercises (Monk et al., 2006). This indicates the positive effect of manual treatment to significantly improve the mobility. Rehabilitation and controlled home exercises is thus recommended to improve the joint's mobility and reduce potential injuries that can occur with long-term inactivity and incorrect load if weight-bearing and rest are not taken into account.

## 2.4 Common treatment methods

The primary treatment forms for CCL injury are surgery, regardless of grade. This is because such an injury develops into osteoarthritis, and surgery can delay the process (VCA Animal Hospitals, 2023). The most common surgical methods for treating this are Tibial Plateau Leveling Osteotomy (TPLO), Tibial Tuberosity Advancement (TTA), and extracapsular techniques (Alvarez et al., 2022).

### 2.4.1 TPLO

The main purpose of this operation is to change the angle and the relationship between the femur and tibia (VCA Animal Hospitals, 2023). This is an open operation that results in sutures and an anatomical bone plate to prevent the tibia from moving forward, giving more stability during walking and greatly reducing future osteoarthritis and inflammation in the joint. After such a procedure, it is often recommended to limit weight-bearing and begin home exercises (Flahery et al., 2023).

### 2.4.2 TTA

This is one of the most common operations for CCL and is often used if the CCL is completely torn (VCA Animal Hospitals, 2023). This surgery stabilizes the knee joint and is often recommended for active and large dogs. Such an operation should be carried out as soon as possible to reduce the likelihood of irreversible joint damage. Rehabilitation is quite similar across surgeries, with reduced weight-bearing and exercises recommended in the postoperative phase.

### 2.4.3 Extracapsular techniques

This is the oldest type of surgery for this injury. An artificial ligament is placed to support the knee joint in the form of stability (VCA Animal Hospitals, 2023). Over the years, this type of surgery has become less common, as TTA and TPLO have shown better long-term results.

After surgery with one of the three mentioned methods, a recovery period is recommended, with limited activity for at least 6–8 weeks. However, TPLO or TTA patients often have fewer restrictions on mild activity (VCA Animal Hospitals, 2023).

## 3.0 Osteopathic manual therapy in rehabilitation

### 3.1 What is Osteopathy, and how is it applied to dogs?

Osteopathy was founded by Andrew Taylor Still in 1874, based on the belief that the body, mind, and spirit are interconnected and that the patient should be treated holistically (Seffinger, 2019).

Modern osteopathy is built upon Still's principles, as described by Seffinger (2019):

1. The body is a unit of dynamic interaction between the physical body, mind, and spirit.
2. An inherent property of this dynamic interaction is the body's capacity for self-regulation and self-healing.
3. Obstruction to the unimpeded flow of body fluids and nerve impulses can compromise this capacity.

4. The musculoskeletal system significantly influences the individual's ability to restore this inherent capacity and therefore resist disease processes.

This means that treatment should target surrounding structures that may contribute to improved healing of the patient. Osteopathy in human healthcare has grown in popularity in recent years. Data from the General Osteopathic Council (2024) show that there were 5,519 registered osteopaths in England in 2024—an increase from 4,584 in 2012.

Animal osteopathy is also on the rise, with 649 registered animal osteopaths worldwide as of 2025 (Animal Osteopathy Worldwide, 2025). The foundation is the same as in human osteopathy—treating the body, mind, and spirit holistically—but with the key difference that animals cannot verbally indicate the location of their pain. Therefore, animal osteopaths rely heavily on visual assessment and hands-on palpation to identify tension or restrictions in the musculoskeletal system (The College of Animal Osteopathy, 2025).

### 3.2 How can OMT support healing, reduce compensation, and increase mobility?

After a CCL operation, various surrounding structures will be involved. The primary structures affected are the knee joint, where swelling and fluid formation will develop. In an osteopathic treatment, one can use drainage treatment, focusing on lymphatic drainage, which will affect the fluid formation that automatically occurs after such an operation.

Secondary effects in surrounding structures can occur in the form of musculature. Several studies have shown that muscle atrophy occurs quickly after this operation (Monk et al., 2006;

Priddy et al., 2003; Vasseur et al., 1992). In one study, quadriceps muscle mass decreased for up to 5 weeks after the operation and only increased at 10 weeks after the operation (Millis et al., 1999; Monk et al., 2006). This shows that manual treatment should be carried out soon after the operation to ensure the shortest possible rehabilitation period. In this study, the group that received manual treatment and home exercises had significant improvements in mobility compared to the group that only used home exercises (Monk et al., 2006). This shows that there was improvement with manual treatment so that mobility was significantly improved.

With an osteopathic approach that focuses on surrounding structures, there will be a greater increase in mobilizing and improving movement in the entire structure.

There is little research on osteopathic treatment for CCL injuries, as well as ACL injuries in humans. There is, however, an experimental study about doing osteopathy in the rehabilitation of patients with recurrent musculoskeletal injuries, and they found that the treatment improves, but because of the low trials, they recommended a randomized and controlled clinical trial (Altinbilek et al., 2018). An RCT from 2018 showed that there were significantly higher functional improvement and pain relief in the group that had OMT than the control group in the function and relief of pain in knee osteoarthritis (Altinbilek et al., 2018).

### 3.3 Limitations and need for further research

Although osteopathy is increasingly used as a supplement in veterinary rehabilitation, there is very little scientific documentation on the effect in dogs after a CCL operation. There are more studies based on human physiology and not animal osteopathy. There is a lack of randomized controlled studies with an intervention of osteopathic treatment and a control group.

There are several studies showing the effects of manual techniques such as joint mobilization, myofascial techniques, and ROM, but the majority are based on clinical experience and observation rather than controlled studies (Clark & Lundgren, 2021). This results in it being challenging to determine how large role osteopathy has in a rehabilitation process. There are, however, indications that osteopathy can improve function, reduce pain, and contribute to increased mobility in combination with other treatments (Millis & Levine, 2014).

## 4.0 Clinical challenges in measuring effect and mobility

### 4.1 How to assess improvement in mobility in dogs

To investigate whether there has been an improvement in mobility in dogs, the results from before or after the operation will be compared with the current condition. This gives an indication of how mobility has changed. Tests such as range of motion (ROM) and stability in the joint, as well as strength, are used after cruciate ligament injuries in humans (Cunha & Solomon, 2022).

If the dog undergoes a rehabilitation program, either with a physiotherapist or osteopath, mobility and improvement in the joint will be thoroughly tested. These are tests such as ROM, gait analysis, and palpation. This reveals whether there has been an improvement in mobility in the joint. ROM examines how the joint moves and whether there are any restrictions affecting the whole joint. Gait analysis indicates how the dog moves biomechanically — whether it walks less on the postoperative leg or if there is equal weight-bearing. Palpation reveals whether there is any hypertonicity in surrounding musculature that negatively affects

the healing of the joint. It can be detected whether the entire complex is compensated by other surrounding structures, which is very common in the postoperative phase.

## 4.2 Limitations in diagnostics (subjective assessment, compensation, measuring equipment)

To make an accurate diagnosis, a veterinarian examines the dog's knee to determine whether there is a CCL injury, either partial or full rupture of the ligament. A clinical test is performed via observation and palpation. Since there are large differences between animals and humans when it comes to pain, it is not as easy to diagnose by asking questions, thus physical tests are more relevant.

If there is an ACL injury in humans, one can use the VAS scale to find out where the patient is on this pain scale. This is a useful tool to understand the patient's pain picture. This is, however, very challenging to use for dogs since there is no verbal communication, and it is difficult for owners to explain the dog's pain. It is therefore very important that the clinician perceives the dog's symptom picture and tests with the clinical tests for this condition.

Observation is frequently used to look for the typical "toe touch," as animals often do not put weight on their injured leg. The vet tests the leg with the cranial drawer sign to check and test tibia to femur for knee laxity or instability (VCA Animal Hospitals, 2023). If the dog is in great pain, this can be challenging, and therefore some are sedated to relax so that the tests

can be performed. To confirm a CCL injury, radiographs are often performed to determine which grade the dog has (Canine Arthritis Management, n.d.; VCA Animal Hospitals, n.d.).

### 4.3 How well is the effect of manual therapy documented?

There is variable documentation on the effect of manual treatment. On the topic being examined in this thesis, there is minimal documentation on osteopathic treatment, but substantial on manual treatment. Three articles on manual treatment are presented to explain the effect of manual treatment.

- Monk et al. (2006) conducted an RCT study where they examined the effect of manual treatment after a CCL operation. It showed that the group that received manual treatment after surgery got better results for ROM of the stifle joint compared to those who only had a home exercise program (Monk et al., 2006).
- In 2021, a systematic review was published with the aim of examining postoperative rehab after a CCL operation. Out of 351 studies, only 19 met the inclusion criteria (Alvarez et al., 2022). Most of these had a high risk of bias, making them less reliable. Nevertheless, the study concluded that manual treatment gave good results for this patient group, but more low-risk studies are needed.
- Altinbilek et al. (2018) conducted a single-blind RCT in humans with knee osteoarthritis. The study showed that the group receiving OMT plus exercise had significantly better pain relief and functional improvement compared to the group with exercise alone.

#### 4.3.1 Systematic review of postoperative rehabilitation interventions after cranial cruciate ligament surgery in dogs (Alvarez et al., 2022)

In this study, only 19 out of 351 studies met the given inclusion criteria set by Alvarez et al., 2022 in their systematic review. The majority of these studies had a high risk of bias, which means the studies are not sensitive. This will result in the findings not being valid, and more studies with a low risk of bias are needed. However, this study concluded that manual therapy provided a good effect on the patient group, giving good results when using manual therapy after this type of operation. Unfortunately, as mentioned, there is a high risk of bias, so more studies with a low risk of bias are required to investigate the effect of manual therapy in postoperative treatment after surgery.

#### 4.3.2 Effects on early intensive postoperative physiotherapy on limb function after tibial plateau leveling osteotomy in dogs with deficiency of the cranial cruciate ligament (Monk et al., 2006)

The publication of this clinical study was in 2009, where there were 8 adult dogs with CCL injury. There was one group that received physiotherapy 3 times a week and a control group that only had home exercises. This study showed that the group that received manual therapy had better effects on ROMs of the stifle joint compared to those who only had a home exercise program (Monk et al., 2006). It concludes that manual therapy should be recommended to build muscles, prevent muscle atrophy, and increase stifle joint flexion and extension ROMs (Monk et al., 2006). However, this is a small study, so the validity is not very high. To conclude

whether this gives a lasting improvement, larger studies with more participants are needed to investigate whether there are any significant differences between the control and test groups.

#### 4.3.3 Osteopathic manipulative treatment improves function and relieves pain in knee osteoarthritis: A single-blind, randomized-controlled trial (Altinbilek et al., 2018)

This study was conducted on humans and examined whether osteopathic manual therapy (OMT) contributes to improved function and pain relief in patients with osteoarthritis. As dogs with a CCL injury will often develop osteoarthritis, this is a relevant article when looking at the effect of OMT. There were 100 people who participated in this study, which is not unusual for human studies that are usually much more extensive compared with research involving animals. Research on humans has progressed further, and this gives results. This study showed that the patient group receiving OMT + exercise had significantly better pain relief and functional improvement compared to the group that only used exercise. The study concludes that OMT is useful in relieving knee pain (Altinbilek et al., 2018).

These three studies were selected based on their relevance to this thesis. Monk et al., 2006 and Alvarez et al., 2022 are the two largest research articles found on PubMed and were therefore used as examples in this section. There are limited articles on postoperative manual therapy in animals, and therefore studies conducted on humans with similar injuries have been supplemented. There are similarities between humans and animals, and thus it was within reason to include an article involving humans rather than only small studies on dogs. There is more research on humans, but again, not much on osteopathic manual therapy. There is limited research on OMT solely as rehabilitation after a CCL operation. Therefore, this thesis

has been supplemented with several articles on manual therapy. Unfortunately, there tends to be a lot of research with a high risk of bias and conducted on a small population (Alvarez et al., 2022; Bennett et al., 1988; Duval et al., 1999; Elkins et al., 1991; Flahery et al., 2023; Moore et al., 2005; Vasseur et al., 1992; Whitehair et al., 1993).

## 5.0 Conclusion

### 5.1 Brief summary of what you have learned or gained increased into

Through this diploma thesis, an attempt has been made to answer whether osteopathic treatment can help increase joint mobility in dogs that have undergone a CCL operation. Three main topics have been reviewed that separately should be able to answer this hypothesis. Unfortunately, there is very little information on osteopathic treatment for animals in general. Therefore, it has been supplemented with various studies on humans who have had ACL problems and knee osteoarthritis. At the same time, an article that investigated OMT as rehabilitation for knee osteoarthritis was included. This study showed great improvement in patients who received osteopathic treatment in the postoperative phase. This resulted in the research indicating an effect on mobility in these patients. Since the treatment of humans and animals is often very similar, this can be applied to the idea of treating animals with CCL injuries. These dogs often develop osteoarthritis, which leads to reduced joint mobility, and thus, since this study tends to show that OMT contributes to increased movement and pain relief, this can be used together with home exercises for dogs to achieve better mobility and improvement in the joint, as well as secondary problems that arise after such an intervention.

## 5.2 Reflection: How this affects your understanding and future practice

This project has given me a greater understanding of general manual treatment for dogs. With a background as an osteopath D.O MNOF in Norway and working primarily with humans, but with a desire to use my expertise on animals, this has been excellent for seeing how similar human and animal treatment can be. Since many patients arrive with ACL injuries — either for rehabilitation or conservative treatment — this has provided insight into how much an osteopath can influence the condition. In my practice, I work a lot with surrounding structures that may potentially have an impact on the primary problem. Osteopathy is based on working holistically and influencing several systems, which often gives good results. If it concerns an ACL injury, there will be a lot of fluid accumulation, and as an osteopath, this can be drained with various pumping techniques, which in turn contributes to better mobility and less pain. This is very exciting and relevant now that I am completing my training as a canine osteopath. Dogs and humans are very similar; many of the same techniques can be applied, adapted to the individual. The understanding I have gained through this type of research has contributed greatly to my future practice. I am ready to receive both small and large dogs and provide them with the best possible treatment.

## 5.3 Possible need for more knowledge or experience in the topics

Several of the articles tend to indicate that manual therapy has an effect when combined in the rehabilitation process. It is shown that mobility in the knee joint improves if manual therapy is used together with home exercises in dogs that have undergone surgery for a CCL injury. However, there are few studies, and several have a high risk of bias. Therefore, it is

recommended to conduct larger studies, preferably randomized controlled studies, as these use at least one control group and one intervention group, making it more likely to produce more reliable research results. More research is needed on the use of osteopathic manual therapy to investigate whether this could become a primary form of treatment for future patients.

There are several studies showing the effects of manual techniques, but there is very little high-quality research specifically on osteopathic manual treatment for dogs and other animals. This applies not only to research on CCL injuries but also to other possible hypotheses.

To answer the hypothesis of this thesis, manual therapy seems to contribute to increased mobility, but there is little research to conclude that manual therapy gives valid improvement as a primary treatment. One can see that the correlation between humans and dogs is quite similar, and in humans, research has come much further. This indicates that it could have a good effect on animals, possibly as a primary treatment in the first instance or as a supplement in the postoperative phase.

## 6.0 Sources

**Alvarez, L. X., Repac, J. A., Swaw, K. K., & Compton, N.** (2022). Systematic review of postoperative rehabilitation interventions after cranial cruciate ligament surgery in dogs. *Veterinary Surgery*, 51(2), 233–243. <https://doi.org/10.1111/vsu.13755>

**Altinbilek, T., Murat, S., Yumusakhuylu, Y., & Icagasioglu, A.** (2018). Osteopathy in the rehabilitation of patients with recurrent musculoskeletal injuries: An experimental study. *Turkish Journal of Physical Medicine and Rehabilitation*, 64(2), 114–120. <https://doi.org/10.5606/tftrd.2018.1384>

**Animal Osteopathy Worldwide.** (n.d.). Find an animal osteopath.

<https://animalosteopathyworldwide.com/find-an-animal-osteopath/>

**Bennett, D., Tennant, B., Lewis, D. G., et al.** (1988). A reappraisal of anterior cruciate ligament disease in the dog. *Journal of Small Animal Practice*, 29, 275–297.

**Canine Arthritis Management.** (n.d.). CCL ruptures & tears.

<https://caninearthritis.org/article/ccl-ruptures-tears/>

Cunha, J. Solomon, D. (2022). ACL Prehabilitation improves postoperative strength and motion and return to sport in athletes. *Arthroscopy, sports medicine and rehabilitation*. 28;4(1). <https://doi.org/10.1016/j.asmr.2021.11.001>

**Duerr, F. M., Martin, K. W., Rishniw, M., et al.** (2014). Treatment of CCL rupture: A systematic review. *Veterinary Surgery*, 43(5), 519–529. <https://doi.org/10.1111/j.1532-950X.2014.12170.x>

**Duval, J. M., Budsberg, S. C., Flo, G. L., et al.** (1999). Breed, sex, and body weight as risk factors for rupture of the cranial cruciate ligament in young dogs. *Journal of the American Veterinary Medical Association*, 215, 811–814.

**Elkins, A. D., Pechman, R., Kearney, M. T., et al.** (1991). A retrospective study evaluating the degree of degenerative joint disease in the stifle joint of dogs following surgical repair of anterior cruciate ligament rupture. *Journal of the American Animal Hospital Association*, 27, 533–540.

**Flahery, M. J., et al.** (2023). Therapy exercises following cranial cruciate ligament repair in dogs. *Veterinary Clinics of North America: Small Animal Practice*, 53(4), 857–868. <https://doi.org/10.1016/j.cvsm.2023.02.013>

**General Osteopathic Council.** (2024, May). Registration report – public item 8. <https://www.osteopathy.org.uk/news-and-resources/document-library/about-the-gosc/council-may-2024-public-item-8-registration-report-final/>

**Johnson, J. A., Austin, C., & Breur, G. J.** (1994). Incidence of canine appendicular musculoskeletal disorders in 16 veterinary teaching hospitals from 1980 to 1989. *Veterinary and Comparative Orthopaedics and Traumatology*, 7, 56–69.

**Millis, D. L., & Levine, D.** (2014). *Canine rehabilitation and physical therapy* (2nd ed., pp. 232–237). Elsevier Health Sciences.

**Monk, M. L., Preston, C. A., & McGowan, C. M.** (2006). Effects of early intensive postoperative physiotherapy on limb function after tibial plateau leveling osteotomy in dogs with deficiency of the cranial cruciate ligament. *American Journal of Veterinary Research*, 67(3), 529–536. <https://doi.org/10.2460/ajvr.67.3.529>

**Moore, G. E., Guptill, L. F., Ward, M. P., Slater, M. R., & Glickman, L. T.** (2005). Evaluation of the risk of cranial cruciate ligament rupture among 196,000 insured dogs in Sweden. *Veterinary Surgery*, 34(5), 449–455. <https://doi.org/10.1111/j.1532-950X.2005.00070.x>

**Priddy, N. H., II, Tomlinson, J. L., Dodam, J. R., et al.** (2003). Complications with and owner assessment of the outcome of tibial plateau leveling osteotomy for treatment of cranial cruciate ligament rupture in dogs: 193 cases (1997–2001). *Journal of the American Veterinary Medical Association*, 222(12), 1726–1732. <https://doi.org/10.2460/javma.2003.222.1726>

**Seffenger, M.** (2019). *Foundations of osteopathic medicine* (4th ed., pp. 2–5). SD Books.

**Spinella, G., Arcamone, G., & Valentini, S.** (2021). Cranial cruciate ligament rupture in dogs: Review on biomechanics, etiopathogenetic factors and rehabilitation. *Veterinary Sciences*, 8(9), 186. <https://doi.org/10.3390/vetsci8090186>

**The College of Animal Osteopathy.** (n.d.). Enhancing veterinary care with animal osteopathy: A holistic approach [Blog post].

<https://www.animalosteopathycollege.com/blog/enhancing-veterinary-care-with-animal-osteopathy-a-holistic-approach>

**Vasseur, P. B., & Berry, C. R.** (1992). Progression of stifle osteoarthritis following reconstruction of the cranial cruciate ligament in 21 dogs. *Journal of the American Animal Hospital Association*, 28(2), 129–136.

**VCA Animal Hospitals.** (n.d.). Cranial cruciate ligament repair: Tibial plateau leveling osteotomy (TPLO). <https://vcahospitals.com/know-your-pet/cranial-cruciate-ligament-repair-tibial-plateau-leveling-osteotomy-tplo>

**VCA Animal Hospitals.** (n.d.). Cranial cruciate ligament repair: Tibial tuberosity advancement (TTA). <https://vcahospitals.com/know-your-pet/cranial-cruciate-ligament-repair-tibial-tuberosity-advancement-tta>

**VCA Animal Hospitals.** (n.d.). Cruciate ligament rupture in dogs. <https://vcahospitals.com/know-your-pet/cruciate-ligament-rupture-in-dogs>

**Whitehair, J. G., Vasseur, P. B., & Willits, N. H.** (1993). Epidemiology of cranial cruciate ligament rupture in dogs. *Journal of the American Veterinary Medical Association*, 203, 1016–1019.

**Witsberger, T. H., Villamil, J. A., Schultz, L. G., Hahn, A. W., & Cook, J. L.** (2008). Prevalence of and risk factors for hip dysplasia and cranial cruciate ligament deficiency in dogs. *Journal of the American Veterinary Medical Association*, 232(12), 1818–1824.  
<https://doi.org/10.2460/javma.232.12.1818>