Case Series

Resolution of Bilateral Luxating Patellas in Two Canines Following Chiropractic: A Case Series & Review of the Literature

Pamela Stone DC, DACCP[1]
Christina Schmidt DC[2]

1. *Private Practice of Chiropractic, Kennesaw, GA*
2. *Private Practice of Chiropractic, Hinckley, OH*

Abstract

Objective: To report on the resolution of bilateral luxating patellas following chiropractic in two canines.

Clinical Features: A one-year old male Aussie/Beagle mix canine and a 2-year old Sheltie canine presented to a private animal chiropractic office with symptoms of luxating patellas and vertebral subluxation.

Intervention and Outcomes: Vertebral subluxations were detected and corrected via static and motion palpation, muscle tone and range of motion. After chiropractic adjustments, both canines showed marked improvement and no longer had symptoms of luxating patellas.

Conclusions: Chiropractic was shown to help both canines with bilateral luxating patellas. More research is necessary to explore the role of chiropractic in canines.

Key words: *Animal chiropractic, luxating patella, subluxation, canine, adjustment*

Introduction

One of the most common orthopedic disorders that affect canines is patellar luxation.[1] The patella, or 'kneecap,' is normally located in a groove on the end of the femur just above the stifle (knee). The term luxating means 'out of place' or 'dislocated'. Therefore, a luxating patella is a kneecap that moves out of its normal location.

The two main types of this disorder include medial patellar luxation (MPL) and lateral patellar luxation (LPL).[2] A third type also exists, known as bidirectional patellar luxation, and is comprised of both MPL and LPL.[1,3] There is a shown association of hindlimb deformities that are associated with patellar luxation, which differ based on the type involved.[4]

While it is common for the condition to only affect one stifle, it is also common for patellar luxation to have bilateral involvement. The rate of bilateral occurrence varies between 20-52% of cases, depending on the published article.[1] The condition may affect canines at any life stage and is considered to be genetically influenced.[4,5]

MPL is considered the most common orthopedic disorder of the canine stifle,[6] and is the most common type of patellar luxation to occur in canines. MPL makes up between 75-90% of all patellar luxation cases, depending on the source used.[1,2] Although it is possible for the condition to appear in both large and small canines, it is most often found in smaller canines.[1,4,5] Specifically, small breeds are 12 times more at risk for MPL than larger canine breeds.[6] Small breeds that patellar luxation, especially medial, commonly afflict include Pekingese, Boston and Yorkshire Terriers, Chihuahuas, small poodle breeds, Pomeranians, Bichon Frise, Pugs, French and other bulldog breeds, Shit-tzus, West Highland White Terriers, and Jack Russells.[1,3]

Associated hindlimb deformities according to Merck include coxa varus, a condition in which the coxofemoral angle of the stifle is decreased. Femoral lateral bowing, tibial internal rotation, shallowed trochlear groove, and medial femoral condylar hypoplasia are other hindlimb deformities associated with MPL.[5] MPL also occurs more commonly in canines with patella alta, a condition in which the patella rests too high.[7]

LPL is the lesser common type of patellar luxation to occur in canines. While certainly the possibility exists that the condition can be found in a canine of any size, LPL most commonly affects large breed canines. Associated hindlimb deformities include coxa valga – an increase in coxofemoral angle, along with femoral medial bowing, tibial external rotation, deepened trochlear groove, and lateral femoral condylar hypoplasia.[4]

LPL also occurs more commonly in canines with patella baja, a condition in which the patella rests too low. These conditions are linked, as an abnormally low patella is not contained by the edges of the trochlea, allowing the patella to then move laterally during activities that require stifle flexion.[7]

While the etiology of patellar luxation is still largely unknown and misunderstood, genetics do play a major factor in the development of the condition. Trauma and degenerative changes such as secondary osteoarthritis may also potentially cause the development of patellar luxation in canines.[4] Other theories of development exist.

One such theory suggests that estradiol hormonal therapy could possibly hinder deepening of the trochlear sulcus.

Another theory proposes abnormal anatomical and biomechanical functions throughout the entirety of the canine hindlimb, especially at the hip joint, can influence the development and progression of patellar luxation during development.

Another proposed method of development suggests due to a decrease of external hip rotation proximally, compensatory internal rotation may be utilized distally. This mechanism allows the limb to make amends for the lack of external rotation at the hip joint, while also contributing to potential degenerative changes at the stifle, initiating development of patellar luxation.[8]

While a canine patient with patellar luxation may present asymptomatically,[1] many times there are existing clinical signs. A canine with this condition often presents with lameness, and possibly with a skipping gait. Upon palpation during clinical examination, displacement of the patella can be detected.[4] Radiographic studies may show distal femur valgus, or a knock-knee appearance, in canines with LPL. In cases of MPL, the radiographic studies may show distal femur varus, or a bowed leg appearance.[7]

The degree of MPL is indicated by a specific grading scale known as the Putnam classification.[6] A Grade 0 is given when the patella does not luxate during examination, and it indicates a normal finding.[1] Grade I patellar luxation is describes mild and infrequent luxation. In Grade I patellar luxation, the patella be manually manipulated into a position of luxation. However, the patella will return to the trochlear groove without manual assistance.

Grade II patellar luxation occurs when, during flexion, the patella luxates. A Grade II luxation will then return to normal positioning upon extension. In Grade III patellar luxation, the patella is more frequently luxated than it is in normal patellar positioning but can still be manipulated back into proper alignment.

Grade IV patellar luxation shows deformities and lameness of the highest degree. Grade IV is considered a permanent luxation of the patella, and the patella is not able to be relocated into proper alignment, even with manual assistance.[1-3,6] Canine patients with Grades III and IV are typically considered surgical candidates.[3]

These days, more and more owners are seeking alternative treatment for their canines, including acupuncture, physical therapy and chiropractic care. The demand for manual therapy, acupuncture, and alternative medicine is increasing among canine owners.[9]

One reason why owners seek complementary procedures for animals, such as chiropractic, is an inability to afford surgery and additional costly therapies such as rehabilitation. Surgery for a luxating patella can range from $1,500 to $3,000 per affected knee. This case report discusses the connection between chiropractic care and luxating patella in two different canines.

Case Report #1

Case History

A neutered 1-year-old male Sheltie/Aussie mix presented for chiropractic evaluation and treatment with a history of bilateral luxating patella, which was grade 2-3 (out of 4, with 4 being the worst). X-rays were taken by the veterinarian to confirm the diagnosis. The owner was referred by the treating veterinarian who had recommended surgery, yet the owner wanted a different option and chiropractic care was recommended. According to the owner, the dog's patellas were luxating several times a day. He would run around and would suddenly switch to running on three legs, would stop and shake his leg, then would return to running normally. This is a common symptom of luxating patellas. He was not on any medications. He was taking glucosamine supplements to support his joints, but the owners did not see any results. The left leg was worse than his right.

Examination

Upon examination, the dog was a bit tentative. Neurological reflexes were all normal. Gait analysis indicated the canine was limping. Gait analysis involves evaluation of limb movement and balance, and may exhibit symmetric and asymmetric gaits.[10] The chiropractic examination consisted of static and motion palpation for the purpose of assessing restrictions with possible pain and muscle tone along the spine. Static palpation revealed increased tone in the paraspinal muscles throughout the lumbosacral and cervical regions. Motion palpation revealed vertebral subluxations in the pelvis, lumbar spine, and cervical spine. Range of motion was restricted. His hind legs did not extend far and he would pull each leg in quickly, indicating the dislike for the stretch and possible pain or discomfort.

Vertebral subluxations were detected and corrected at a PI (posterior inferior) ilium on the right, L5 and L7 as a posterior left, L1 as a posterior, and C1 on the right (listing of APR). In addition, bilateral coxofemoral joints were adjusted in the caudal direction. Slight trigger points were was done on each iliopsoas, gluteal muscles and biceps femoris, bilaterally.

Intervention & Outcomes

The canine returned for his second visit 12 days later and the owners reported that he was moving better and that he was not having as many knee issues. Segments adjusted included right

PI ilium. L5, T13 and C1 and coxofemoral joints bilaterally. In addition, more muscle release was done at the glutes, iliopsoas and biceps femoris. The canine returned 16 days later for this third visit, and the owners stated that his knees were luxating less often, more like every 2-3 days instead of every day. Segments adjusted included right PI ilium, phalanges, L3, T13, and C1. In addition, more muscle trigger points were done at the glutes, iliopsoas and biceps femoris.

On his fourth visit, one month later, the owner stated that the knees were barely luxating anymore. They could take him on walks without any problems. They were given home instructions to work on his iliopsoas and gluteal muscles. On his 5th visit, they reported no problems. He was continued to be seen once a month for six months.

The owners reported him jumping up and off the couch and car without incidence. His legs were strong enough to jump up and he was running with a lot of energy. At the time of this writing, this canine was being seen every 4-6 weeks with no new problems reported and no more occurrences of luxating patellas.

Case Report #2

Case History

A spayed 5-year-old female Husky presented for chiropractic evaluation and treatment with a history of bilateral luxating patella with the left knee worse than the right. The owner was referred for chiropractic evaluation by the treating veterinarian when the owner asked for different options for correcting the problem. The dog was rescued at age 3 from a Husky rescue group, and presented at that time with weak legs, the inability to lift her tail, and was heartworm positive. According to the owner, the dog was unable to do a full stretch, would stop and shake her legs on their daily walks, seemed very wobbly and would spin around as if she was trying to shake, and both patellas would "pop out" several times a day. She was taking Cosequin and Green Mussel supplements to support her joints and was not on any medication.

Examination

The chiropractic examination consisted of static and motion palpation, along with range of motion, gait analysis and reflex testing. Upon examination, the dog was tentative yet friendly. Her neurological reflexes were all normal. Static palpation revealed increased tone in the paraspinal muscles throughout the lumbosacral regions. Motion palpation revealed vertebral subluxations in the pelvis, lumbar spine, and thoracic spine. There were no noticeable areas of heat along her spine, which can often indicate inflammation. Range of motion was restricted as she had the inability to extend both legs. At each attempt at extension, she would immediately bring the leg back into her, indicating the dislike for the stretch, possible discomfort, and indicator of vertebral subluxation. Gait analysis showed the dog had a narrow trot, did not have a limp for several yards but it was followed by a limping of the left leg, stopping and starting again with a short narrow trot. This repeated upon evaluation.

Vertebral subluxations were detected and corrected as posterior at T10 and T13, left posterior at both L3 and L5, and caudal left and right coxofemoral joints were adjusted. Trigger point work was done on the left iliopsoas.

Intervention & Outcomes

The canine returned for his second visit 15 days later and the owners reported that they hadn't seen much of a change. Segments adjusted included left PI ilium (posterior & inferior). L5 left posterior, occiput posterior on the right, and coxofemoral joints bilaterally. In addition, more muscle release was done at the iliopsoas.

The canine returned 9 days later and the owners stated that her knees were still luxating but she had much more energy. At the 4th visit 14 days later, they reported that her knees seemed to be much better. By the 7th visit, which was approximately 12 weeks later, they reported she was stretching much more, was able to do the classic down dog position which she had never done, and her knees were not luxating at much. At each visit over the course of the care, she was check and assessed for vertebral subluxation, and adjusted as indicated.

At the 8th visit, 16-weeks into care, the owners stated they had seen a big difference, her knees "didn't feel like Jello" anymore, and there was no more constant popping. They could take her on walks without any problems and she could play hard in the yard and at doggie day care without limping. She did have one slip while on a walk one day but was able to get adjusted and improved right away. At time of publication, the dog continued to be under chiropractic care on a monthly basis with no further incidences of luxating patellas.

Discussion

Chiropractic Adjustment

Chiropractic addresses vertebral subluxations in the spine and skeletal system via the chiropractic adjustment. A subluxation, in terms of animal chiropractic, is defined as a shift in the normal structure of one vertebra compared to those above and below, causing a biomechanical change that can interfere with the proper function of the nervous system. A chiropractic adjustment most often involves a high-velocity, low-amplitude (HVLA) application of a force to the spine.[11]

The technique used by the chiropractor was Motion Palpation technique with a high velocity, low amplitude adjustment. The doctor did static and motion palpation for subluxations within the canine's spine in order to determine a listing and then manually adjusted the subluxations. A chiropractic adjustment is applied in the line of correction using specific hand placements, the right tension and a high velocity thrust.

Through static and motion palpation the chiropractor was able to objectively find subluxations within the patient's spine and extremities. The goal is to deliver an adjustment that will increase the mobility of the joint that is restricted. In this case, there was lack of movement in the pelvis, and as a result, this causes excess movement in the associated limbs, which may contribute to the luxating patella.

Patellar Luxation

Treatment of patellar luxation ultimately depends on the degree of the condition. In canines who exhibit Grade I or II luxation of the patella without concurrent lameness, conservative measures that may be used include weight management, rehabilitative exercise, massage, hydrotherapy, and NSAIDs.

While Grade I or II may be treated conservatively, oftentimes, surgery is indicated to assist the stifle in regaining some stability if lameness is present. Various surgical methods exist for treating the condition of patellar luxation, including both soft tissue and bone restructuring techniques.

Surgical musculature release, imbrication, sutures to prevent rotation and desmotomy all comprise techniques utilized on soft tissue for patellar luxation repair. Surgically deepening the trochlear groove, transposing the tibial tuberosity and osteotomies are utilized to reconstruct the osseous structures of the joint that contribute to recurrent patellar luxation. A newer prosthetic device known as the Ridgestop™ has also been used surgically to increase height of the ridges beside the trochlear sulcus, and ultimately, assist in preventing further patellar luxation.[3]

Patellar luxation can result in devastating effects on the surrounding stifle joint. Osteoarthritis or abnormal bone deformities may develop within the stifle joint at an early age, causing lifelong joint challenges.[3] It is also possible that canines with patellar luxation could experience concurrent cranial cruciate ligament (CCL) or medial meniscal damage.[4]

MPL has been known to increase risk of cranial cruciate degeneration due to the abnormally high amount of stress being placed on the CCL from the luxating action of the patella.[12] Erosion of the long digital extensor tendon at the origin site can commonly be found in large canines with long-term LPL as well.[7] Despite these possibilities, prognosis is typically considered good in mild or moderate cases of patellar luxation.[4]

Biomechanical stress is influential in both the development of patellar luxation and the secondary changes potentially associated with patellar luxation. Biomechanics is the field that studies "the structures of movement in a living being… and the study of the physiological consequences of that movement."[13] For example, lameness, which can arise from patellar luxation, redistributes weight and changes gait pattern of dogs, causing abnormal biomechanics of first, the ipsilateral hindlimb, followed by the contralateral hindlimb, contralateral forelimb, and ipsilateral forelimb.[14]

In 2015, a published study examined lumbar spine and pelvic movements in dogs that were walking and trotting. Researchers concluded that although the amount of movement in the canine lumbar spine was low, lumbar, and pelvic movements were strongly associated with functionality of the hindlimb.

Therefore, spinal and pelvic dysfunctions probably affect the hindlimb, and dysfunctionality of the hindlimb also likely influences spinal and pelvic functions as well. Due to the demonstrated interconnected nature of the lower spinal units and the pelvic limb, Wachs, et al. suggested that the entirety of the musculoskeletal system should be examined together and treated as a cohesive unit.[15]

Animal Chiropractic

Animal Chiropractic is a growing field. Because many people are seeking chiropractic care for themselves and their families, these animal owners are also turning to chiropractic care for their pets. Chiropractic care for humans has been around for more than one hundred years, being officially discovered in 1895. However, in the animal world, it is relatively new, as it was formalized in the late 1980's by Dr. Sharon Willoughby, who held degrees in both veterinary medicine and chiropractic.[16]

Based off her studies and her experience, she created a post-graduate program and school that became known as Options for Animals, based in Wellsville, KS.[17] Since that time, several other animal chiropractic colleges have been created.[18] There are two animal chiropractic certifying organizations, including the American Veterinary Chiropractic Association (AVCA) and the International Veterinary Chiropractic Association (IVCA).

One emerging therapeutic set of techniques that could be utilized to address the entirety of the musculoskeletal system in animals is chiropractic. Chiropractic is a non-invasive method that utilizes chiropractic adjustments to the spine to improve spinal health and re-establish neuro-musculoskeletal balance.

Although typically performed on humans, improvement following chiropractic care has been documented in a variety of species with numerous different conditions. Despite the limited number of studies that do exist, one intriguing factor of chiropractic performed on animals is that there is little to no evidence supporting the idea that animals can be affected by the placebo effect.[19]

One such published case study documented the improvement of a Pomeranian with MPL under chiropractic care. This dog experienced a right recurrent patellar luxation following left patellar luxation surgical intervention. The examiner of this canine found areas of abnormally increased tone within the affected side's psoas and sartorius musculature. Dysfunction of the right sacroiliac joint was also found by the examiner.

Chiropractic adjustments and muscular release techniques were then utilized to re-introduce motion into the areas of decreased function and movement. Over the time in which this therapy was used, the luxation episodes decreased and eventually the canine patient was documented as being free of luxating incidents.[20]

Limitation

One limitation to this study is that it is only two cases. Another limitation was the lack of subjective data as the canines were unable to articulate if there was any pain or pain relief. The treating chiropractor can only base the patient's progress through a report from the owner and observation.

There is a need for additional animal chiropractic research.

Conclusion

The demand for complementary and alternative veterinary medicine is increasing among animal owners. This case series provides supporting evidence that the use of conservative chiropractic care to find and adjust subluxations may be beneficial to canines experiencing luxating patellas. Due to the overall shortage of research on the benefit of chiropractic for animals, there is a call for more research to be done in the future.

References

1. Harasen, G. Patellar luxation. Can Vet J. 2006 Aug;47(8):817-8.
2. McGowen C, Goff L. Animal Physiotherapy: Assessment, Treatment and Rehabilitation of Animals. 2nd ed. West Sussex, UK: Wiley Blackwell; 2016.
3. Di Dona F, Della Valle G, Fatone G. Patellar luxation in dogs. Vet Med (Auckl). 2018 May 31;9:23-32.
4. Patellar Luxation in Dogs and Cats [Internet]. Merckvetmanual.com [cited 2020 Dec 20]. Available from: https://www.merckvetmanual.com/musculoskeletal-system/arthropathies-and-related-disorders-in-small-animals/patellar-luxation-in-dogs-and-cats.
5. Aiello SE, Moses MA, Allen DG, Constable PD, Dart A, Davies PR, et al. The Merck Veterinary Manual. 11th ed. London, England: Merck; 2016.
6. Olimpo M, Piras LA, Peirone B. Pelvic limb alignment in small breed dogs: a comparison between affected and free subjects from medial patellar luxation. Vet Ital. Jan-Mar 2016;52(1):45-50.
7. Lewis DD, Langley-Hobbs SJ. Small Animal Orthopedics, Rheumatology, & Musculoskeletal Disorders. 2nd ed. Boca Raton, FL: CRC Press; 2015.
8. Harasen, G. Patellar luxation: pathogenesis and surgical correction. Can Vet J. 2006 Oct;47(10):1037-9.
9. Lane DM, Hill SA. Effectiveness of combined acupuncture and manual therapy relative to no treatment for canine musculoskeletal pain. Can Vet J. 2016;57(4):407-414.
10. DeChamp CE. Kinetic and kinematic gait analysis and the assessment of lameness in the dog. Vet Clin North Am Small Anim Pract. 1997;27(4):825-40.
11. Reed WR, Cao DY, Long CR, Kawchuk GN, Pickar JG. Relationship between biomechanical characteristics of spinal manipulation and neural responses in an animal model: effect of linear control of thrust displacement versus force, thrust amplitude, thrust duration, and thrust rate. Evid Based Complement Alternat Med [journal on the Internet]. 2013:12 pages. doi:10.1155/2013/492039.
12. Alam RM, Ji JR, Kim MS, Kim NS. Biomarkers for identifying the early phases of osteoarthritis secondary to medial patellar luxation in dogs. J Vet Sci. 2011 Sep;12(3):273-80.
13. Eschbach D. Sciences of chiropractic (neurology and biomechanics) [Internet]. Optionsforanimals.com. [cited 2020 Dec 23]. Available from: https://optionsforanimals.com/wp-content/uploads/2019/02/Sciences_of_Chiropractic.pdf.
14. Goldner B, Fischer S, Nolte I, Schilling N. Kinematic adaptations to induced short-term pelvic limb lameness in trotting dogs. BMC Vet Res. 2018 Jun 13;14(1):183.
15. Wachs K, Fischer MS, Schilling N. Three-dimensional movements of the pelvis and the lumbar intervertebral joints in walking and trotting dogs. Vet J. 2016 Apr;210:46-55.
16. Maler M. Overview of veterinary chiropractic and its use in pediatric exotic patients. Vet Clin North Am Exot Anim Pract. 2012 May;15(2):299-310.
17. Bockhold, H, Eschbach D. The history of animal chiropractic. In: Options for Animals College of Animal Chiropractic Basic Course Notes, vol 1. Wellsville (KS): Options for Animals; 2005. p. 2-5.
18. https://www.animalchiropractic.org/avca-approved-post-graduate-programs/
19. Rome PL, McKibbin M. A review of chiropractic veterinary science: An emerging profession with somatic and somatovisceral anectdotal histories. Chiropr J Aust. 2011 Dec;41(4):127-39.
20. McDonald M. Case study: Conservative chiropractic management of a recurrent medial luxating patella in a dog. Chiropr J Aust. 2009 Mar;39(1):27-8.