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Case Report

# Bilateral Legg-Calvé-Perthes Disease and Grade 4 Patellar Luxation in a Pomeranian Dog: A Case Report

## Pomeranian Irkı Bir Köpekte Bilateral Legg-Calvé-Perthes Hastalığı ve 4. Derece Patellar Luksasyon: Olgu Sunumu

**M.Volkan YAPRAKCI[1], İpek OKCUOĞLU[1,✉]**

[1]Department of Veterinary Surgery, Faculty of Veterinary Medicine, Afyon Kocatepe University, Afyonkarahisar, Türkiye

**Corresponding Author:**
İpek OKCUOĞLU
✉ipekokcuoglu@yahoo.com

**ORCID:**
MVY: 0000-0003-2793-4295
İO: 0000-0003-0633-4952

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### Abstract

This case report material consisted of a 2-year-old, 3 kg, intact male Pomeranian dog that presented to the Surgical Clinic of the Afyon Kocatepe University Veterinary Health Application and Research Center. According to the anamnesis, the clinical symptoms were congenital. Clinical examination revealed restricted joint movement in the hind legs during gait, and the dog used its extremities like a cane. Pain was detected in the hip joint and stifle joints during the examination. Clinical and radiographic examinations resulted in a diagnosis of bilateral Legg-Perthes-Calve syndrome and grade 4 medial patellar luxation. This case highlights the importance of examining both the hip and knee joints together in the evaluation of hind limb lameness in small breed dogs.

**Keywords:** Dog, Legg-Calve-Perthes disease, Osteonecrosis, Patellar dislocation

### Öz

Bu olgu sunumu materyalini Afyon Kocatepe Üniversitesi Veteriner Sağlık Uygulama ve Araştırma Merkezi Cerrahi Kliniğine gelen 2 yaşında ve 3 kg ağırlığında, Pomerian ırkı kısırlaştırılmamış erkek köpek oluşturdu. Alınan anamneze göre klinik semptomların kongenital olduğu anlaşılmıştır. Klinik muayenede hayvanın yürüyüşü sırasında arka bacaklardaki eklem hareketlerinin kısıtlı olduğu ve ekstremitelerini baston gibi kullandığı gözlemlenmiştir. Muayene sırasında kokso-femoral ve genu ekleminde ağrı bulgusu olduğu saptanmıştır. Yapılan klinik ve radyografik muayeneler sonucunda bilateral Legg-Perthes-Calve ve 4. Derece mediale patellar luksasyon tanısı saptanmıştır. Bu olgu, küçük ırk köpeklerde arka ekstremite topallıklarının değerlendirilmesinde hem kalça hem de diz eklemlerinin birlikte incelenmesinin önemini ortaya koymaktadır.

**Anahtar Kelimeler:** Köpek, Legg-Calve-Perthes hastalığı, Osteonekroz, Patellar dislokasyon

## Introduction

Legg-Calvé-Perthes disease (LCPD) is a developmental disorder that usually occurs in small and young breed dogs weighing less than 12 kg, between the ages of 4 and 12 months (Aguado and Goyenvalle, 2021; Mapuvire, 2023). Known in the literature by various names such as avascular or aseptic necrosis of the femoral head, the disease was first described by Tutt in 1935 (Filho et al., 2011; Aguado and Goyenvalle, 2021).

Although the etiology of the disease is not fully understood, genetic predisposition is thought to play a significant role. The pathogenesis of Legg-Calvé-Perthes disease is reported to be influenced by age, breed, diet, metabolic disorders such as obesity, sex, and blood levels of sex hormones. Dogs most susceptible to this disease are small and young breeds such as Yorkshire Terriers, Dachshunds, Poodles, and Chihuahuas (Szabóová and Bajczer, 2024). Furthermore, congenital and hereditary factors, environmental factors such as acute and chronic repetitive trauma and mechanical overload, juvenile osteoarthritis, thromboembolism, certain endocrine diseases and infections, as well as a monogenic recessive gene, have been reported to play a role in the development of the disease (Aguado and Goyenvalle, 2021; Özdemir and Baloğlu, 2010).

The disease is pathophysiologically characterized by ischemia and necrosis resulting from impaired blood flow to the femoral head. The disorder is thought to be caused by hormonal influences, hereditary factors, anatomical structure, intracapsular pressure, and femoral head artery infarction. The repair process begins via fibrovascular tissue around the femoral head. Repeated forces on necrotic bone lead to fissures in the articular cartilage, collapse of subchondral trabeculae, and flattening of the femoral head; this discrepancy results in osteoarthritis of the coxofemoral joint (Jankovits et al., 2012). The pathological process involves cartilage and bone necrosis, subchondral fracture, and epiphysis revascularization. Reduced mechanical resistance due to ischemic necrosis, combined with the load on the hip joint, leads to progressive deformity (Trostel et al., 2003). Increased intra-articular pressure due to synovitis or abnormal limb positioning can lead to vascular collapse and impaired blood flow. This process results in ischemic necrosis in the epiphyseal spongy tissue. In the early stages of necrosis, a characteristic pale white discoloration is observed in the subchondral bone due to decreased perfusion, while the necrotic bone tissue initially retains its mechanical integrity. Subsequently, osteoclasts resorb the necrotic tissue while new bone layers are formed. This irregular remodeling process reduces the load-bearing capacity of the subchondral bone, leading to collapse of the femoral head, loss of contour, and consequently, secondary osteoarthritis (Trostel et al., 2003).

The clinical picture usually begins with lameness due to pain. In young animals, symptoms start with lameness and are mostly unilateral. Intermittent lameness is frequently observed. However, some dogs experience sudden lameness or complete absence of leg support. Bilateral involvement is rare (12-16.5%) (Cardoso et al., 2018). Symptoms usually appear in dogs aged 4–11 months, most frequently between 6–10 months. Sudden or intermittent lameness, hip pain, crepitation, and muscle atrophy, which may be accompanied by a history of trauma, are the main findings. As the disease progresses, weight-bearing on the extremity decreases and muscle atrophy becomes more pronounced. While males and females are equally affected, bilateral involvement has been reported in only 12–16% of cases (Trostel et al., 2003). The degree of lameness varies from mild lameness to complete leg sling. Clinical signs worsen over time. Irritability due to pain may be observed in affected animals. They may especially resist jumping and climbing stairs. In later stages, pain during abduction or extension movements, crepitation in the hip joint, shortening of the affected leg, and atrophy of the gluteal and quadriceps muscles may develop (Aguado and Goyenvalle, 2021). Physical examination typically reveals marked muscle atrophy, particularly in the gluteal and hamstring muscle groups, and seen in the affected hind legs. The response to hip manipulation is usually severe, especially during extension (Scott and Witte, 2012).

Radiography is generally used to confirm the diagnosis. Ljunggren (1967) defined 5 levels in radiographic terms for determining the severity of the disease in LCPD;

Grade 1: Widening of the joint space and presence of low-density foci.

Grade 2: Flattening of the femoral head and formation of small spurs (osteophytes) in the acetabulum.

Grade 3: Changes in bone contours and prominence of the acetabular spur.

Grade 4: Significant deformation of the femoral head and large radiolucent areas.

Grade 5: Fragmented appearance of the femoral head and advanced acetabular changes (Figure 1) (Scott and Witte, 2012).

Both conservative and surgical treatment options are available for LCPD. Conservative treatment is recommended for dogs with lameness and small radiographic lesions. This treatment is based on reducing physical activity, pain management, and physiotherapy. The effectiveness of conservative treatment ranges from 18% to 25% (Cardoso et al., 2018). It has been reported that lameness improves in less than 25% of dogs treated with rest, limited exercise, and the use of nonsteroidal anti-inflammatory drugs to provide analgesia (Jankovits et al., 2012). If improvement does not occur within 2 to 3 months, surgical treatment should be recommended (Piek et al., 1996). The preferred initial method is osteotomy resection of the femoral head and neck (FHNO). Nearly normal movement is achieved postoperatively in 48-78% of cases (Cardoso et al., 2018). (Off et al., 2010) showed that although 96% of owners were satisfied, only 56% of dogs showed satisfactory improvement. Total hip replacement is commonly used in the treatment of various hip diseases in dogs, including non-septic osteoarthritis, skull fractures, and traumatic femoral dislocation. Total hip replacement is the preferred method for eliminating pain and restoring normal function in dogs weighing more than 15 kg. Consequently, it is stated that the preferred treatment should be techniques such as hip replacement, not FHNO (Jankovits et al., 2012).

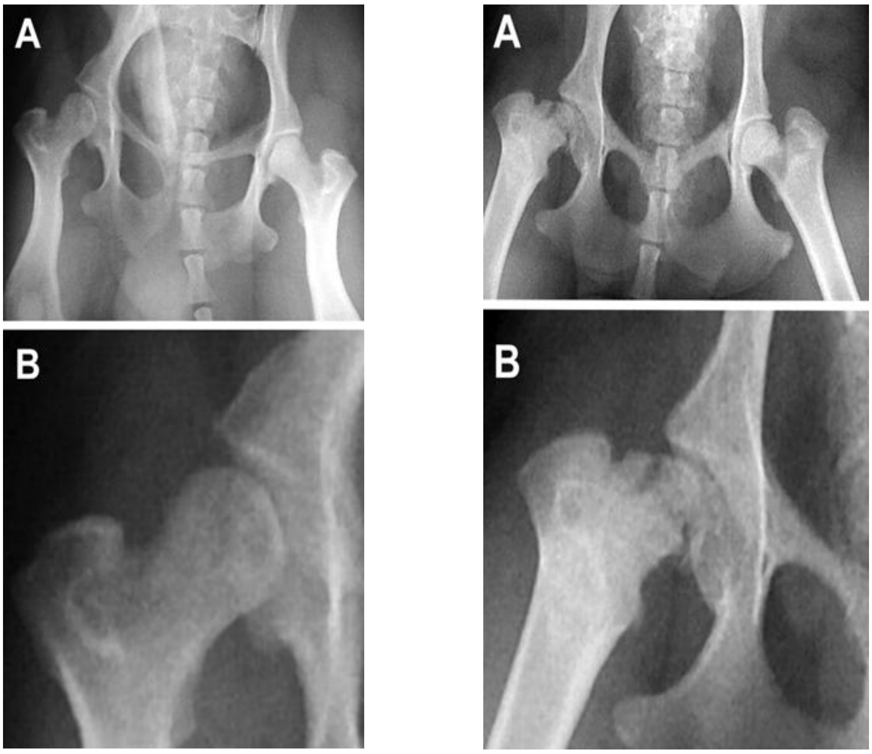


**Figure 1.** (Left) Grade 2 LCPD; Radiolucent area, deformity, and small osteophyte in the acetabulum are observed in the femoral head. (B) Magnified view of the lesion. (Right) Grade 5 LCPD; (A) Advanced resorption, significant deformity, and loss of integrity are seen in the femoral head. (B) High-magnification image showing the fragmentation of the femoral head in detail (Scott and Witte, 2012).

## Case Description

A 2-year-old unneutered male Pomeranian was brought to the Surgical Clinic of Afyon Kocatepe University Veterinary Health Application and Research Center with complaints of lameness. According to the owner's history, the lameness was congenital but had recently worsened. The dog also used its hind limbs like a cane while walking and had recently experienced loss of appetite. Clinical examination revealed significant muscle atrophy and limited range of motion in the hind limbs. Palpation revealed pain in the coxofemoral and genu joints. Furthermore, it was determined that the patellas were permanently displaced medially, exhibiting findings consistent with grade 4 luxation.

Radiographic examination of the patient revealed deformation of the femoral heads on both sides in ventrodorsal and lateral pelvic radiographs, with radiolucent areas and subluxation findings in the epiphyseal region. Severe deformation and fragmentation were observed in the contours of the femoral head. These findings were evaluated as radiographic manifestations of collapse and fragmentation processes secondary to aseptic femoral head necrosis. In the knee joints, the patellas were found to be medially displaced, consistent with grade 4 dislocation. The radiographic findings also supported a severe medial patellar dislocation along with bilateral LCPD (Figure 2).

Complete blood count showed leukocyte, erythrocyte, hematocrit, and hemoglobin values within reference ranges, and no findings suggestive of systemic infection or inflammation were observed. These results supported the conclusion that the case was primarily due to an orthopedic pathology. Elevated serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels are key indicators of hepatocellular damage; a markedly elevated AST level, in particular, can be associated with liver necrosis as well as skeletal muscle myopathy. Evaluation of specific muscle enzymes such as CK is recommended to determine the source of the AST increase. The fact that GGT and BUN parameters remained within normal limits supports the possibility of a mild or chronic hepatic lesion rather than acute liver failure in this case (Forster et al., 2018).

Based on clinical and radiographic findings, a staged surgical plan was devised for the patient: bilateral femoral head and neck resection (FHO) and tibial tuberosity transposition and trochlear sulcus deepening to correct grade 4 medial patellar luxation. Postoperative treatment with analgesics, antibiotics, and physiotherapy was also recommended. However, the patient's family refused the proposed surgical procedures, and therefore the planned treatment protocol could not be implemented. Consequently, no data could be obtained regarding the patient's prognosis and long-term outcomes.

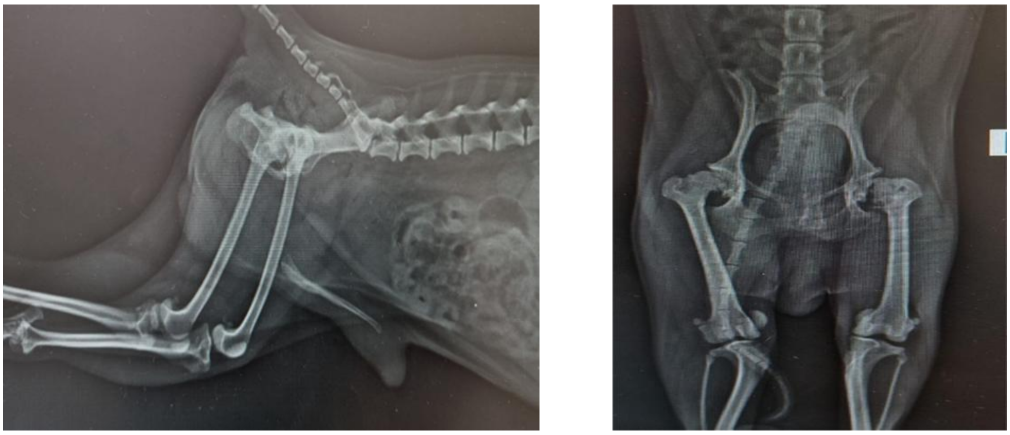

**Figure 2.** Latero-lateral view of the pelvis (A). Ventrodorsal pelvic radiograph showing deformation of both femoral heads, enlargement of both coxofemoral joint spaces, and radiolucency (white arrow) in both femoral heads (B).

## Discussion and Conclusion

In this case, bilateral Legg-Calvé-Perthes disease and concomitant grade 4 medial patellar luxation were detected in a small Pomeranian dog. The literature states that LCPD is a genetically based, multifactorial orthopedic disease resulting from avascular necrosis of the femoral head epiphysis and is mostly seen in small breed dogs aged 4–10 months (Szabóová and Bajczer, 2024; Mapuvire, 2023). Although the presented case is 2 years old, which is later than the classic age of onset, the clinical and radiographic findings are consistent with typical LCPD lesions described in the literature. Szabóová and Bajczer reported that bilateral involvement occurs in only 11.6% of cases (Szabóová and Bajczer, 2024). This makes our case a rare but clinically significant example. Furthermore, LCPD is characterized by lameness, hip pain, muscle atrophy, and decreased range of motion; Numerous sources emphasize that radiographic findings show deformity of the femoral head, radiolucent areas, subchondral collapse, and deformation (Warren and Dingwall, 1972; Scott and Witte, 2012). In our case, the clinical and radiographic findings were consistent with typical LCPD findings reported in the literature.

In our case, bilateral patellar luxation concurrently with LCPD is a rare and clinically significant association (Özsoy and Altunatmaz, 2003). Although patellar luxation has been reported in some LCPD cases, most studies have not systematically addressed this association. Therefore, reviews examining LCPD cases show that patellar luxation may occasionally accompany the case, but most series do not systematically report this relationship; this supports the uniqueness of our case (Scott and Witte, 2012). This case highlights the importance of evaluating both hip and knee joints together in diagnosis and treatment.

In most cases of LCPD and patellar luxation reported in the literature, no significant deviations in hematological and biochemical parameters have been reported. A general assessment of this biochemical profile highlights the possibility of reactive hepatopathy due to chronic inflammation. While significant abnormalities in the protein profile suggest a diagnosis of a chronic systemic disease, the elevation of liver enzymes can be interpreted as a hepatic manifestation of this condition.

Clinically, lameness, limited joint movement, muscle atrophy, and pain are advanced findings of LCPD, and similarly observed in our case. According to a study by Mapuvire (Mapuvire, 2023), radiolucent areas, deformity, and subluxation in the femoral head on radiography are decisive in diagnosis, and only 25% of cases treated conservatively are successful. Szabóová and Bajczer also state that in advanced cases (Ljunggren score IV–V), pain control and restoration of function are achieved with femoral head and neck resection (FHNO/FHO) (Szabóová and Bajczer, 2024).

The success rate of conservative methods in the treatment of LCPD is below 25%, and most cases are reported to develop permanent lameness and secondary osteoarthritis (Warren and Dingwall, 1972; Scott and Witte, 2012). Surgical femoral head and neck resection (FHO/FHNO) is the most frequently used salvage procedure in this disease and provides pain reduction and functional recovery. In recent years, total hip replacement has yielded better results in restoring function in small breed dogs (Scott and Witte, 2012). However, in this case, surgical intervention could not be performed due to the owner's refusal. This situation limits the evaluation of the prognosis and long-term outcomes. In addition, the presence of concomitant grade 4 patellar luxation in the case is considered another factor that aggravates the clinical picture and hinders recovery.

In this case, the planned treatment could not be carried out because the patient's owner did not consent to the surgical intervention. It is emphasized that parental consent and financial constraints can directly affect diagnosis and treatment, and that treatment delays can negatively impact the prognosis (Mapuvire, 2023). This situation was also a determining factor in the management of our case.

Additionally, the presence of grade 4 patellar luxation in the same patient complicated the clinical picture by increasing the severity of lameness due to both the pathology in the hip joint and the biomechanical imbalance in the knee joint. Although rarely reported in the literature, this suggests that multiple orthopedic anomalies can occur together in young breeds.

In conclusion, this case demonstrates the importance of a detailed evaluation of both hip and knee joints when small breed dogs present with lameness. The occurrence of severe medial patellar luxation along with bilateral LCPD is rare but leads to significant functional loss. This case shows that the combination of LCPD and concurrent bilateral patellar luxation can be rare but clinically significant in dogs. Current literature addresses LCPD and patellar luxation separately; publications systematically reporting the coexistence of these two pathologies are limited. In this context, our case provides a unique contribution to literature. As emphasized in the literature, conservative treatment is often insufficient, and surgical interventions significantly improve prognosis. In this case, surgical treatment was not accepted by the owner, and long-term functional outcomes could not be achieved. Early diagnosis, correct surgical approach, and postoperative care are once again highlighted as critical for pain relief and functional recovery in such cases. Finally, compiling and publishing similar cases will better reveal the prevalence of this combination, its possible pathophysiological links, and its long-term course.

**Conflict of interest:** No conflict of interest declared.

**For Studies with Ethics Committee Approval:** *This study didn’t require ethics committee approval according to national regulations.*

**Obtaining Informed Consent:** *Written informed consent was obtained from the animal owner.*

**For Studies That Do Not Require Ethics Committee Approval:** *This study didn't require ethics committee approval according to national regulations.*

**For Studies Conducted in More Than One Country:** *Ethical approval is not necessary for this study.*

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**Data Availability Statement:** *The data supporting the findings of this study are available from the authors upon reasonable request.* ***Corresponding Author Contact:*** *ipekokcuoglu@yahoo.com*

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## References

Aguado, E., & Goyenvalle, E. (2021). Legg Calvé Perthes disease in the dog. Morphologie, 105(349), 143-147.

Cardoso, C. B., Rahal, S. C., Mamprim, M. J., Oliveira, H. S., Merlchert, A., Coris, J. G. F., & dos Reis Mesquita, L. (2018). Avascular necrosis of the femoral head in dogs-retrospective study. Acta Scientiae Veterinariae, 46, 5-5.

Forster, G. M., Stockman, J., Noyes, N., Heuberger, A. L., Broeckling, C. D., Bantle, C. M., & Ryan, E. P. (2018). A comparative study of serum biochemistry, metabolome and microbiome parameters of clinically healthy, normal weight, overweight, and obese companion dogs. Topics in companion animal medicine, 33(4), 126-135.

Jankovits, D. A., Liska, W. D., & Kalis, R. H. (2012). Treatment of avascular necrosis of the femoral head in small dogs with micro total hip replacement. Veterinary Surgery, 41(1), 143-147.

Ljunggren, G. (1967). Legg-Perthes disease in the dog. Acta Orthopaedica Scandinavica, 38(sup95), 1-79.

Mapuvire, T. (2023). Legg-Calvé-Perthes Disease in the Dog: A Case-Based Review. South African Veterinary Association.

Off, W., & Matis, U. (2010). Excision arthroplasty of the hip joint in dogs and cats. Veterinary and Comparative Orthopaedics and Traumatology, 23(05), 297-305.

Özdemir, H., & Baloğlu, M. (2010). Femur başının avasküler nekrozu: Tanı ve tedavisi. Türk Ortopedi ve Travmatoloji Birliği Derneği Dergisi, 9(4), 41-51.

Özsoy, S., & Altunatmaz, K. (2003). Köpeklerde Legg-Calvé-Perthes (avasküler femur başı nekrozu) lezyonlarının etiyolojik ve radyolojik değerlendirilmesi: 49 olgu. J. Fac. Vet Med. Istanbul, 29(2), 179–184.

Piek, C. J., Hazewinkel, H. A. W., Wolvekamp, W. T. C., Nap, R. C., & Mey, B. P. (1996). Long term follow-up of avascular necrosis of the femoral head in the dog. Journal of small animal practice, 37(1), 12-18.

Scott, H. and Witte, P., 2012 'Diagnosis and Treatment of LeggCalvé-Perthes Disease' Vet Times (www.vettimes.co.uk/article/ diagnosis-and-treatment-of-legg-calve-perthes-disease/), pp. 1-6

Szabóová, R., & Bajczer, C. (2024). LEGG-CALVÉ-PERTHES DISEASE IN CLINICAL CASE STUDIES IN DOGS. FOLIA VETERINARIA, 68(4), 25-32. Scott, H. and Witte, P., 2012 'Diagnosis and Treatment of

LeggCalvé-Perthes Disease' Vet Times (www.vettimes.co.uk/article/ diagnosis-and-treatment-of-legg-calve-perthes-disease/), pp. 1-6.

Trostel, C. T., Pool, R. R., & McLaughlin, R. M. (2003). Canine lameness caused by developmental orthopedic diseases: panosteitis, Legg-Calve-Perthes disease, and hypertrophic osteodystrophy. Compendium, 25(4), 282-293.

Warren, D. V., & Dingwall, J. S. (1972). Legg-Perthes disease in the dog--a review. The Canadian Veterinary Journal, 13(6), 135.